UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

June 21, 2013

MEMORANDUM FOR: William W. Stelle, Jr.
Administrator, Northwest Region

FROM: James W. Balsiger, Ph.D.
for Administrator, Alaska Region

SUBJECT: 2012 Annual Report for the Alaska Groundfish Fisheries Chinook Salmon Incidental Catch and Endangered Species Act Consultation

We are providing to you the 2012 annual report on salmon incidental catch in the Alaska groundfish fisheries. This report fulfills one of the terms and conditions of the December 2, 2009, and the January 11, 2007 (NMFS 2007), supplements to the November 30, 2000, Biological Opinion (BiOp) regarding Authorization of the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) Groundfish Fisheries. In addition, a supplemental BiOp was issued on January 9, 2012, on the reinitiation of Endangered Species Act (ESA) section 7 consultation on incidental catches of Chinook salmon in the GOA groundfish fisheries, which concluded that the GOA groundfish fisheries are not likely to jeopardize the continued existence of the listed salmon Evolutionarily Significant Units (ESUs) (NMFS 2012).

This memorandum and attachments provide the latest information regarding salmon incidental catch in the Alaska groundfish fisheries and the progress on developing management measures to minimize the take of salmon in the groundfish fisheries. Information reported includes the 2012 incidental catch of salmon, the Coded-Wire Tag (CWT) recoveries, genetic studies, and the development and an update on the implementation of new management measures to minimize salmon incidental catch in the Bering Sea and GOA pollock fisheries. Each issue is detailed below.

We also request re-initiation of ESA section 7 consultation for the GOA groundfish fisheries due to the recovery of two coded-wire tagged Chinook salmon from the Snake River fall-run ESU in 2012 in the GOA pollock fishery. Additional information regarding this first-time event is further discussed under the section on CWT recoveries for the GOA groundfish fisheries.

Incidental Catch of Salmon in the Alaska Fisheries and the Incidental Take Statement for Chinook Salmon

The amount of Chinook salmon incidental catch in the Alaska groundfish fisheries in 2012 was below the incidental take statement amounts for both the BSAI and GOA groundfish fisheries. Attachment 1 provides updated sector-specific information regarding salmon incidental catch in the BSAI and GOA groundfish fisheries for 2004 through December 31, 2012. Approximately 87% of this incidental catch in the BSAI and GOA occurred in the pollock pelagic trawl fishery.

The amount of Chinook salmon incidental catch in the BSAI groundfish fisheries in 2012 of 12,947 fish (Attachment 2, Table 1), is less than the incidental take limit for Chinook salmon in the Bering Sea pollock fishery as managed under Amendment 91 prohibited species catch (PSC) limits and less than the combined incidental take limit of the PSC limit under Amendment 91 and the 8,745 Chinook salmon for the non-pollock fisheries in the BSAI management area. The BSAI fishery incidental take amount statement was revised in accordance with Amendment 91 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP) (NMFS 2009a). Table 1 in Attachment 2 provides data from 1991 to present for incidental catch of Chinook salmon in the Community Development Program (CDQ) fisheries and non-CDQ fisheries. The numbers in Attachment 2 tables vary slightly from Attachment 3 because catch accounting data from March 2013 was used to estimate incidental catch for Attachment 2, Tables 1 and 2, while May 2013 data was used to estimate incidental catch for Attachment 3. The Catch Accounting System is a dynamic system that is continuously updated. For the GOA groundfish fisheries in 2012, the estimated incidental catch of Chinook salmon was estimated at 22,550 fish (Attachment 3). This is below the incidental take statement of 40,000 fish in the 2012 supplemental BiOp.

North Pacific Groundfish and Halibut Observer Program Bycatch Sampling

The Alaska Fisheries Science Center (AFSC), Fisheries Monitoring and Analysis (FMA) Division manages the North Pacific Groundfish and Halibut Observer Program (Observer Program), which monitors groundfish and halibut fishing activities in the U.S. Exclusive Economic Zone off Alaska. The Observer Program is responsible for the collection of fisheries data used by managers for stock assessment and inseason monitoring of the commercial groundfish and halibut fisheries. Data collected by observers are used by managers to monitor quotas, manage groundfish and PSC, and document interactions with protected resources. These data provide the best available scientific information for managing fisheries and developing measures to minimize incidentally caught species, including salmon. The methods used to estimate the number of incidentally caught salmon in the Alaska federal groundfish fisheries vary by area and fishery.

Observers are deployed in the field for up to three months at a time and debrief with FMA staff following their deployment. The data are not finalized until all observers return from the field for debriefing and their data are scrutinized following FMA quality control protocols. Generally, the annual observer data are finalized in late February to early March of the year following the fishery; the 2012 observer data have been finalized.

Bering Sea Pollock Fishery Sampling and Data Collection

The Bering Sea pollock fishery is one of the most heavily observed fleets in the nation. In August 2010, NMFS published regulations implementing Amendment 91 to the BSAI FMP (75 FR 53026, August 30, 2010). These regulations, effective January 1, 2011, require 100% observer coverage in the Bering Sea pollock fisheries regardless of vessel length, a census of all salmon species in every haul or fishing trip, and an expanded biological sampling program. Also, NMFS requires shoreside processors to provide a location from which the observer is able to view all sorting and weighing of fish, as well the storage area for salmon. A new sampling protocol for Chinook salmon in the Bering Sea pollock fishery was initiated at the start of the 2011 fishing year. This protocol was designed to conform with recommendations provided in Pella and Geiger (2009). This new protocol includes a complete census of salmon bycatch in the pollock fishery which is then sampled systematically by observers. On catcher/processors and motherships, the vessel personnel are required to save all salmon in an approved storage container until the end of the haul, and electronic monitoring systems are used to ensure compliance with this rule. Before the start of the next haul, the observers count and identify every salmon retained. Observers implement a systematic sampling design for the identified Chinook and chum salmon by selecting every tenth Chinook and every thirtieth chum encountered. The selected fish are used to obtain a length measurement, a genetic tissue sample, and five scales to verify species identification. These fish are also checked for a missing adipose fin, indicating a CWT.

Chinook and chum salmon that are not selected using the systematic sample design are identified by species and counted but no additional biological data are collected. All other salmon species are identified, measured, counted, and checked for a missing adipose fin. Additionally, a separate scale collection is done to verify the observer's identification.

Catcher vessel observers check every salmon encountered in their randomly collected at-sea composition samples for missing adipose fins and collect a scale sample to verify species identification. The catcher vessel observers monitor to ensure that no salmon are discarded at sea to the best of their ability. Total retained salmon numbers and related genetic samples are obtained from catcher vessel pollock deliveries at the processing facility by the plant observer.

Once the catch is delivered to the processing facility, the plant and vessel observers monitor the entire offload to ensure that all retained salmon are sorted and placed in an approved salmon storage container. The observers collect total salmon numbers and associated biological specimens following the same procedure outlined above for catcher/processors and motherships.

In the 2012 Bering Sea pollock fishery, 1,157 Chinook and 819 chum salmon were measured for length. Of these fish, 1,122 Chinook and 717 chum were sampled for genetic tissue (Table 1). In addition, 5 Chinook, 1 chum, and 1 pink salmon were missing their adipose fin, and their heads were shipped to the Auke Bay Laboratories (Auke Bay Lab) to be scanned for CWT presence and analysis. It is important to note that every biological specimen, such as genetic tissue samples or scale samples, is associated with a length. For this reason the total number of length measurements is expected to exceed the total number of any biological specimen (Table 1).

BSAI Non-pollock Fishery Sampling and Data Collection

The non-pollock fisheries in the BSAI, such as flatfish and Pacific cod trawl, contribute a smaller number of incidentally caught salmon in comparison to the Bering Sea pollock fishery. In these fisheries, the total number of incidentally caught salmon was obtained by using vessel observer at-sea species composition samples that are extrapolated to the vessel's total catch. Sampling protocols for observers in these non-pollock fisheries are different than those in the pollock fishery, and genetic tissue samples are not required to be collected. However, all salmon species encountered in the randomly collected at-sea species composition samples are checked for missing adipose fins indicating a potential CWT, and scale samples are collected to verify species identification.

In BSAI non-pollock fisheries in 2012, observers measured a total of 38 Chinook and 67 chum salmon; one Chinook salmon was missing an adipose fin and the head was shipped to the Auke Bay Lab (Table 1).

Table 1. Number of length, genetic, and CWT samples collected from incidentally caught salmon in the 2012 Bering Sea/Aleutian Islands pollock and non-pollock fisheries

		Sample		
Area/fishery	Salmon species	Lengths[3]	Genetic tissue	CWT[1]
BS pollock				
	Chinook	1,157	1,122	5
	Chum	819	717	1
	Coho	7	n/a[2]	0
	Pink	42	n/a[2]	1
	Sockeye	13	n/a[2]	0
	subtotal	2,038	1,839	7
BSAI non-pollock				
	Chinook	38	n/a[2]	1
	Chum	67	n/a[2]	0
	Coho	2	n/a[2]	0
	Pink	0	n/a[2]	0
	Sockeye	0	n/a[2]	0
	subtotal	107	n/a[2]	1
Total		2,145	1,839	8

[1] Salmon head collected from fish missing adipose fin.

[2] n/a = not part of sampling protocol

[3] length measurements

GOA Pollock Fishery Sampling and Data Collection

In 2012 the GOA groundfish fleet must have 100% coverage for catcher vessels greater than 125 ft. length overall (LOA), while catcher vessels between 60 ft. and 125 ft. LOA must have 30% coverage. In 2011, the Observer Program's biological salmon sampling protocols for the GOA pollock fishery were revised to be as consistent as possible with the changes implemented in the Bering Sea pollock fishery. In January 2012, vessels participating in the directed pollock trawl fisheries agreed to voluntarily retain all salmon encountered while fishing for pollock in the Western and Central GOA in anticipation of Amendment 93 to the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP), which requires 100% retention of all salmon caught in Western and Central GOA pollock fisheries (NMFS, 2011). In July 2012, NMFS published regulations implementing Amendment 93 to the GOA FMP (77 FR 42629, July 20, 2012). These regulations, effective August 25, 2012, require 100% retention of all salmon caught in the directed pollock trawl fishery.

The voluntary 100% retention of all salmon in the pollock fishery allowed catcher vessel observers to check every salmon encountered in their randomly collected at-sea composition samples for missing adipose fins, collect a scale sample to verify species identification and complete a census of salmon retained by vessel personnel after monitoring the vessel offload at the processing facility. The catcher vessel observers monitor that no salmon are discarded at sea to the best of their ability. The vessel observers collect total salmon numbers and associated biological specimens following the same procedure outlined above for catcher/processors and motherships fishing for Bering Sea pollock. Genetic samples from Chinook and chum salmon were obtained by plant observers from vessel pollock deliveries at the processing facility using the systematic sample design described above.

It is important to note that, unlike in the Bering Sea pollock fishery, vessel observers were not deployed on all catcher vessels fishing pollock in the GOA, and plant observers only collected genetic samples from the salmon made available to them by the processing facility. Comparisons between vessel observer data, plant observer collections, and industry provided fish ticket data indicate discrepancies between the number of salmon caught on observed vessels and those made available for genetics sampling in the plant.

Data collected from the observed vessels indicate the relative numbers and species of salmon incidentally taken in the GOA pollock fishery. The total numbers of incidentally caught salmon were obtained using the number encountered by vessel observers during the vessel offload at the processing facility. In rare circumstances where the offload sample was not completed, NMFS Alaska Region used the number of salmon in the at-sea samples to extrapolate to the entire vessel offload.

Total numbers of all other salmon species were collected following the Chinook and chum sampling protocols described above while length measurements and biological data were only collected from salmon encountered within the at-sea composition sample or during the vessel offload monitored by the vessel observer. In the 2012 GOA pollock fishery, 1,017 Chinook, 4 chum, 17 coho, and 1 sockeye salmon were measured for length. Of these fish, 972 Chinook and 3 chum salmon were sampled for genetic tissue (Table 2). In addition, 24 Chinook and 1 coho

salmon were missing their adipose fin, and their heads were shipped to the Auke Bay lab to be scanned for CWT presence and analysis. It is important to note that every biological specimen, such as genetic tissue samples or scale samples, is associated with a length. For this reason the total number of lengths is expected to exceed the total number of biological specimens.

GOA Non-pollock Fishery Sampling and Data Collection

The non-pollock fisheries in the GOA, such as flatfish and Pacific cod trawl, contribute a smaller number of incidentally caught salmon in comparison to the pollock fishery. In 2012, observer coverage for groundfish vessels was the same for both pollock and non-pollock vessels with the exception of the rockfish fishery that requires 100% observer coverage regardless of vessel length.

In these non-pollock fisheries, the total number of incidentally caught salmon is obtained using at-sea species composition samples collected by vessel observers and extrapolated to the vessel's total catch. Observers' at-sea samples in these non-pollock fisheries are collected using the same methods as BSAI non-pollock fishery sampling protocols described above.

In the 2012 GOA non-pollock fisheries, observers measured a total of 78 Chinook, 12 chum, and 3 coho salmon. A total of 32 Chinook salmon were sampled for genetic tissue. Of these fish, 5 Chinook were missing an adipose fin (Table 2). Salmon heads were collected and shipped to the Auke Bay Lab to be scanned for CWT presence and analysis.

Table 2. Number of samples collected from incidentally caught salmon in the 2012 Gulf of Alaska pollock and non-pollock fisheries

Area/fishery	Salmon species	Lengths[3]	Genetic tissue	CWT[1]
GOA pollock				
	Chinook	1,017	972	24
	Chum	4	3	0
	Coho	17	0	1
	Pink	0	0	0
	Sockeye	1	0	0
subtotal		1,039	975	25
GOA non-pollock				
	Chinook	78	32	5
	Chum	12	n/a[2]	0
	Coho	3	n/a[2]	0
	Pink	0	n/a[2]	0
	Sockeye	0	n/a[2]	0
subtotal		93	32	5
Total		1,132	1,007	30

[1] Salmon head collected from fish missing adipose fin.

[2] n/a = not part of sampling protocol

[3] Length measurements

The CWT Program in the Greater Pacific Region of North America

Coded Wire Tags (CWTs) are an important source of information for the stock-specific ocean distribution of those Chinook salmon stocks that are tagged with CWTs and caught as bycatch in the BSAI and GOA groundfish fisheries. Since the late 1960s, CWTs have been used in the greater Pacific region (Alaska, British Columbia, Washington, Idaho, Oregon, and California) to mark anadromous salmonids, particularly hatchery fish (Nandor et al. 2010). Coastwide, more than 53 million juvenile Chinook salmon have been tagged with CWTs in the last several years (2009 and 2010 brood years) by 36 State, Federal, Tribal, and private entities in the United States and Canada, at more than 160 hatcheries and rearing facilities on the West Coast, in addition to natural origin fish trapped and tagged at many sites. The total number of Chinook salmon represented by these 53 million tagged Chinook salmon is over 162 million fish annually (2009 and 2010 brood years). Over a billion Chinook salmon from the greater Pacific region have been tagged with CWTs since 1968. CWT data are used for many purposes, including stock contribution studies where fishery managers seek information on the contribution rates of key stocks in a given fishery (by time and area strata) in order to better manage harvest rates for conservation of the resource (Nandor et al. 2010). CWT data play a key role in the Pacific Salmon Treaty allocations and management of transboundary stocks (Nandor et al. 2010). After 40 years, the CWT program in the greater Pacific region of North America continues to be the most important tool for salmonid research and management (Nandor et al. 2010).

However, CWTs do not provide information on all Chinook salmon stocks harvested in the GOA and BSAI. In particular, no wild or hatchery origin Alaska Chinook salmon stocks are currently being tagged with CWTs in other regions outside of Southeast Alaska. A tagging program on Chinook salmon in the Cook Inlet, Alaska region ended with the 2008 brood year, and no Western Alaska Chinook salmon stocks are currently being tagged. Yukon River (Whitehorse Hatchery, Yukon Territory, Canada) Chinook salmon were tagged with CWTs from 1984 to 2005, and after an interlude, that CWT tagging program was started again with the 2009 brood year.

Although some tagging of wild stocks occurs (mainly in Southeast Alaska), CWTs are used mostly for tagging of hatchery fish. Wild stocks of Chinook salmon are generally under-represented by CWTs, especially outside of Alaska. In the greater Pacific region, Alaska has had the strongest tagging program on wild stocks of Chinook salmon. Of the 26 million CWT Chinook salmon that have been tagged and released in Alaska from the 1992 brood onward, 88% were of hatchery origin and 12% were from wild stocks. Of the 787 million CWT Chinook salmon that have been tagged and released in all locations other than Alaska from the 1992 brood onward, 98% were of hatchery origin, 1% was from wild stocks, and 1% was from mixed-origin stocks.

Because of recent persistent statewide declines in Chinook salmon productivity in Alaska, the Alaska Department of Fish and Game (ADF&G) Chinook Salmon Research Team is recommending establishing a suite of twelve Chinook salmon indicator stocks of wild origin that will provide an ongoing statewide index of Chinook salmon productivity and abundance trends (ADF&G Chinook Salmon Research Team 2013). The twelve Chinook salmon indicator stocks originate in the Unuk, Stikine, Taku, Chilkat Rivers in the Southeastern Alaska region, the

Copper, Susitna, and Kenai Rivers in the Central Alaska region, the Karluk, Chignik, Nushagak, Kuskokwim Rivers in Western Alaska, and the U.S. side of the transboundary Yukon River (ADF&G Chinook Salmon Research Team 2013). A key component of the recommended stock assessment program will involve tagging a representative number of wild juvenile Chinook salmon from each indicator stock with CWTs (ADF&G Chinook Salmon Research Team 2013).

The CWT Program in Alaska

Processing Chinook Salmon Heads from Adipose Fin-Clipped Salmon at Auke Bay Laboratories CWT Lab at Ted Stevens Marine Research Institute (TSMRI)

CWTs are recovered from adipose fin-clipped salmon collected by the AFSC FMA Observer Program from the salmon bycatch in the GOA and BSAI groundfish fisheries. Salmon heads from adipose fin-clipped salmon are periodically sent to the Auke Bay Lab for processing. After CWTs are identified, extracted, read, and verified under a microscope, the recovery data associated with each CWT are entered into a NMFS database. Once the recovery data and tag data have been verified and finalized, they are reported to the coastwide Regional Mark Information System (RMIS) of the Pacific States Marine Fisheries Commission (PSMFC). At that point the data are available for further analysis.

CWT releases from ESA-listed ESUs

The North Pacific Fishery Management Council (NPFMC) contracted with Cramer Fish Sciences to compile a database of CWT release groups of ESA-listed west coast salmon and steelhead, last updated in January 2013 (Vaughan 2013). This database was compiled using the PSMFC's RMIS CWT database and a list of artificial propagation programs determined by NMFS to be included in an ESA-listed ESU. From this database it can be determined which CWT Chinook salmon recovered in the GOA and BSAI originated from ESA-listed ESUs.

CWT Expansions

Ideally, it would be preferable to calculate a total estimated contribution of Chinook salmon from stocks of interest harvested in the GOA and BSAI in order to determine the impact of the fisheries on these stocks. Total estimated contributions for CWT recoveries can be calculated in a two-step process involving a sampling expansion factor and a CWT marking expansion factor (see Attachment 4, Recovery Estimation Technique, for a more detailed explanation).

Starting in 2011 in the Bering Sea pollock fishery, sampling expansion factors can be calculated for CWT recoveries from the bycatch, thus allowing calculation of total estimated contributions for stocks of interest. In 2011 in the BSAI, a systematic random sampling design recommended by Pella and Geiger (2009) was implemented by the Observer Program to collect genetic samples and check for adipose fin-clipped salmon from approximately 1 out of 10 Chinook salmon (10% sampling rate) encountered as bycatch in the Bering Sea pollock fishery. This 10% sampling rate for the BSAI was established to meet genetic sampling goals, and that salmon heads from adipose fin-clipped salmon would be collected at this same rate.

A sampling rate adequate for genetic sampling, however, may not necessarily be adequate for CWT sampling. According to the Regional Mark Processing Center of the PSFMC, all recovery agencies should strive to randomly sample at least 20% of the commercial landings to have a statistically acceptable estimate of total tag recoveries for a given area-time stratum (Nandor et al. 2010). The ADF&G Chinook Salmon Research Team also recommends that sampling for CWTs be increased to the coastwide standard of 20% of the catch in both the Eastern Bering Sea and GOA trawl fisheries (ADF&G Chinook Salmon Research Team 2013). It should also be pointed out that CWTs provide certain data that genetic sampling cannot replicate, such as positive identification that a fish originated from an ESA-listed ESU. However, there are considerable costs associated with higher sampling rates, as well as added logistical complexity of having differing sampling rates to meet different objectives (CWTs versus genetic samples).

Sampling expansion factors cannot be calculated for the CWT recoveries in the GOA pollock fishery before 2012 or the Bering Sea pollock fishery before 2011 because of limitations with how the data were collected. In these fisheries, salmon heads from adipose fin-clipped salmon were collected not only from the observers' samples, but also opportunistically when encountered by observers outside of the sample. For CWT recoveries from these fisheries, it is unknown whether the CWTs were collected from *inside* or *outside* either the genetics or the observer species composition sample sets. A sampling expansion factor can only be calculated from CWTs recovered from *inside* a sample where the total number of sampled fish is known. Of the 71 documented CWT recoveries of Chinook salmon from ESA-listed ESUs by observers in the GOA trawl fishery before 2012, three CWTs are known to have been recovered from *inside* the sample, three CWTs were recovered *outside* the sample, and for the remaining 65, the sample status is unknown. Starting in 2012 in the GOA, adipose fin-clipped salmon were collected only from inside a genetic sample at the offload or from inside the vessel observer's species composition sample.

However, CWT marking expansions can be calculated for each CWT recovery from the mark expansion factors for each tag code (Attachment 5, Table 1). Because not all fish in a tag release group are actually tagged with CWTs, marking expansion factors account for the fraction of each release group that is not tagged (see Attachment 4, Recovery Estimation Technique). Additionally for ESA-listed ESUs, the CWT mark expansion of each CWT recovery can be adjusted to take into account the untagged, wild component of each ESU that is not represented by CWTs to derive a total mark expansion for each ESU (Attachment 4). Without being able to calculate total estimated contributions because of unknown sampling expansion factors, total mark expansions offer the closest approximation to the contribution of Chinook salmon from ESA-listed ESUs in the GOA and BSAI. Total mark expansions should be considered minimal estimates for the actual total contribution of Chinook salmon from ESA-listed ESUs in the GOA before 2012 and the BSAI before 2011.

Occurrence of ESA-listed Chinook Salmon ESUs in the GOA and BSAI

Recoveries of CWTs from *outside* the sample (or from unknown sample origin) are still important for documenting occurrence of ESA-listed ESUs in the GOA and BSAI trawl fisheries. Chinook salmon from the Lower Columbia River (LCR), Upper Willamette River (UWR), Snake River fall-run (SRf-r), and Upper Columbia River Spring (UCR) ESUs have been recovered in

the GOA trawl fishery. Since 1984, CWTs have been recovered from 23 LCR, 109 UWR, 2 SRf-r, and 1 UCR Chinook salmon in the GOA trawl fishery, and from 9 LCR and 12 UWR Chinook salmon in the BSAI trawl fishery, both pre- and post-listing (Attachment 5, Tables 1 and 2). By applying a total mark expansion factor to account for the wild, untagged component of each ESU, the estimated numbers increase to 125 LCR, 405 UWR, 4 SRf-r, and 1 UCR Chinook salmon in the GOA and 10 LCR and 76 UWR Chinook salmon in the BSAI (Attachment 5, Tables 1 and 2). The number of CWT UWR recovered in 2012 (10) was the highest number recovered since 2000. The 2 SRf-r CWT recoveries in the GOA pollock fishery in 2012 are the first Chinook salmon from the SRf-r ESU ever recovered in the GOA.

Research surveys have documented the occurrence of other ESUs of ESA-listed Chinook salmon in the GOA besides the LCR, UWR, SRf-r, and UCR taken in the groundfish fisheries. Small numbers of the Puget Sound (PS) Chinook ESU, the Snake River Spring/Summer (SRS/S) Chinook ESU, and the Snake River Basin (SRB) steelhead ESUs have also been recovered in the GOA in addition to the LCR, UWR, SRf-r, and UCR Chinook ESUs also documented in the GOA fishery. Since 1991, CWTs have been recovered from 3 LCR, 1 PS, 5 SRS/S, 4 UCR, 12 UWR Chinook salmon and 1 SRB steelhead in domestic and foreign research surveys in the GOA (Attachment 5, Tables 3 and 4). By applying a total mark expansion factor to account for the wild, untagged component of each ESU, the estimated numbers increase to 7 LCR, 1 PS, 13 SRS/S, 5 UCR, and 89 UWR Chinook salmon (Attachment 5, Tables 3 and 4).

Origins and Distribution of CWT Chinook Salmon in the GOA

Over time the majority of CWT Chinook salmon recovered as bycatch in the GOA originated from British Columbia and Alaska. Recoveries of CWT Chinook salmon in the bycatch of the GOA groundfish fishery are summarized by state or province of origin (Attachment 9, Table 1). Since 1995, most of the recovered CWTs of Chinook salmon in the GOA fishery have originated from British Columbia (30%) and Alaska (29%), followed by Oregon (23%), Washington (18%) and Idaho (<1%). When accounting for CWT mark expansions for each tag code (see Attachment 4, Recovery Estimation Technique), British Columbia provided 48% of CWT Chinook bycatch, followed by Alaska (34%), Oregon (11%), Washington (8%), and Idaho (<1%). In 8 out of those 18 years, however, Alaska was the major provider of the year's CWT Chinook salmon bycatch in the GOA after accounting for CWT mark expansions. Since the 1992 brood year, the major producing States' release of Chinook salmon tagged with CWTs (expressed in numbers of juveniles released) have been Washington (45%), followed by California (22%), Oregon (14%), British Columbia (10%), Idaho (6%), and Alaska (3%). Based on CWT mark expansions, while 82% of the CWT Chinook salmon bycatch in the GOA has originated from British Columbia and Alaska, British Columbia and Alaska together produced only 13% of the CWT Chinook salmon released in the greater Pacific region of North America during this time period.

Few CWTs have been recovered in the GOA trawl fishery in the last few years (excluding the 71 CWTs recovered in a CWT Tunnel Detector Test described later in this report), compared to previous years. In the 2011 GOA trawl fishery, 19 adipose fin-clipped Chinook salmon were collected from the 297 fish examined by observers, an adipose-clip rate of 6.4%. Eight CWT Chinook salmon were recovered from the 2011 GOA groundfish fisheries bycatch (Attachment

9, Table 1). In the 2012 GOA trawl fishery, 30 adipose fin-clipped Chinook salmon were collected from the 1017 fish examined by observers, an adipose-clip rate of 2.9%. Five CWT Chinook salmon have been recovered from the 2012 GOA bycatch sampled by observers. The 2012 CWT summary data should be considered preliminary.

Most of the Chinook salmon recovered with CWTs and harvested in the GOA originated from hatchery production (Attachment 9, Table 3), a reflection of the fact that wild stocks of Chinook salmon are under-represented by CWTs, especially outside of Alaskan production. Overall since 1995, 95% of the Chinook salmon bycatch represented by CWTs has been of hatchery origin, 3% from wild stocks, and 2% of mixed hatchery-wild stocks. For Alaska-origin CWT Chinook salmon, however, wild stocks comprised 9% of the bycatch of Alaskan stocks in the GOA since 1995, with hatcheries providing the other 91%. Since 2009, wild stocks have provided 19% of the Alaska-origin CWT Chinook salmon harvested in the GOA, with hatchery stocks providing the other 81%. Washington was the only other state of origin with recoveries of tagged, wild Chinook salmon in the GOA.

The CWT Chinook salmon recovered in the GOA comprised a variety of run-types, and the percentage of each run-type varied by state or province of origin (Attachment 9, Table 5). The different designated run-types are determined by the tagging agency. Overall, the most prevalent run-type of CWT Chinook salmon in the GOA was Spring (45%), followed by Fall (31%), Summer (20%), and small numbers of other run-types. For Alaska stocks, 100% of CWT recoveries were Spring run-type. For British Columbia, the most prevalent run-type was Summer (43%), followed by Fall (31%) and Spring (26%). Washington Chinook were predominantly Fall run-type (57%), followed by Summer (25%), Late Fall Upriver Bright (8%), Spring (6%), and Late Fall (3%). Oregon Chinook were predominantly Spring (54%), followed by Fall (41%), Late Fall Upriver Bright (3%), and Winter (1%).

The CWT Chinook salmon recovered in the GOA from 1995 to 2012 comprised a number of age classes from age-2 to age-6 (Attachment 7, Table 1). Ages of CWT recoveries were calculated by subtracting the brood-year of each CWT recovery from the recovery-year to come up with a total-age for each fish. Almost half of the CWT recoveries were from age-3 fish (45%), followed by age-4 (33%), age-2 (15%), age-5 (6%), and age-6 (1%).

CWT Tunnel Detector Test for the GOA Pollock Fishery

In 2012, Auke Bay Lab conducted a CWT Tunnel Detector Test, a feasibility study with the ultimate goal of increasing the sampling rate for CWTs in the Chinook salmon bycatch from the GOA pollock trawl fishery. A CWT tunnel detector was tested at a processing plant in Kodiak, Alaska during two study periods in the GOA pollock fishery in September and October, 2012. Because the tunnel detector detects CWTs electronically, a successful test and future implementation of tunnel detectors at processing plants could augment the number of salmon heads collected from adipose fin-clipped salmon by observers on fishing vessels. Use of tunnel detectors in processing plants could thus be an effective means to increase the sampling rate for CWTs from the Chinook salmon bycatch in the GOA pollock fishery.

Many of the 2012 CWTs reported above were recovered during the CWT Tunnel Detector Test. A total of 1,203 Chinook salmon was tested with the tunnel detector, resulting in 71 CWT recoveries, a CWT occurrence ratio of 1 CWT per 16.9 fish examined (5.9% CWT occurrence rate). This compares favorably with the CWT occurrence ratio of 1 CWT per 16.5 fish examined (6.0% CWT occurrence rate) observed in the Southeast Alaska Chinook troll fishery for 2012 (Ron Josephson, ADF&G, personal communication, 2012). Out of the 1,203 Chinook salmon examined, 187 had a clipped adipose fin, a rate of 15.5%. Similarly, of the total Chinook salmon sampled in the southeast Alaska troll fishery in 2012, 15.4% had clipped adipose fins. Out of the 71 CWTs recovered in the Tunnel Detector Test, 61 (86%) had a clipped adipose fin, and 10 (14%) had no fin clips. Overall, 33% of Chinook salmon with an adipose fin clip had a CWT, while 67% of Chinook salmon with an adipose clip had no CWT.

The use of tunnel detectors at processing plants has the potential to increase the numbers of CWTs recovered in the Chinook salmon bycatch in the GOA trawl fisheries. At the CWT occurrence rate of 5.9% observed in the Tunnel Detector Test in 2012, the total bycatch of 20,769 Chinook salmon in 2011 would have been expected to include 1,225 CWTs. A sampling rate of 20% could thus have been expected to yield 245 CWTs, in contrast to the actual sampling regime for CWTs in the GOA in 2011 which yielded only 8 CWTs (Attachment 9) out of the total bycatch of 20,769. With implementation of Amendment 93 and the CWT recoveries collected in the 2012 Tunnel Detector Test, the observed recovery of CWTs increased to 76 tagged fish, an improvement over 2011 recovery based on similar quantities of incidentally caught salmon; but still not meeting the recommended 20% sampling rate.

The number of tagged Chinook salmon recovered in the Tunnel Detector Test in 2012 represents the highest number of CWTs recovered in the GOA since 2000, both in terms of observed number of tags and CWT mark expansions (Attachment 9, Tables 1 and 2). Oregon and Washington contributed the largest portion of the Chinook salmon bycatch in the GOA as sampled with the Tunnel Detector Test in 2012, with Alaska and British Columbia contributing a lesser portion, in terms of both observed numbers of tags and CWT mark expansions (Attachment 9, Table 2). This is opposite to the trend in the 1995–2012 averages, where Alaska and British Columbia contributed the largest portion of the bycatch, and Oregon and Washington contributing lesser portions (Attachment 9, Table 1). Only Chinook salmon of hatchery origin were recovered in the Tunnel Detector Test in 2012 (Attachment 9, Table 4), in contrast to the 1995–2012 averages, where a small percentage of wild fish have been recovered (Attachment 9, Table 3).

Chinook salmon recovered in the Tunnel Detector Test were comprised of a variety of run-types, and the percentage of each run-type varied by state or province of origin. All Alaska Chinook recoveries were spring-type Chinook, as is generally consistent with Chinook CWT recoveries from 1995–2012 (Attachment 9, Tables 5 and 6). A larger percentage of British Columbia Chinook salmon captured in 2012 was summer run than in 1995–2012. For Oregon and Washington Chinook salmon, larger proportions of spring run and late fall upriver brights were recovered in 2012 than in 1995–2012. The only Idaho Chinook salmon recovered was a single late fall upriver bright.

Age class distributions were also different in the 2012 Tunnel Detector Test than in 1995–2012 (Attachment 7, Tables 1 and 2). Age refers here to total-age, freshwater plus saltwater periods.

Most CWT recoveries were Age-2, followed by Age-3 and small numbers of Age-4 and Age-5. For the 1995–2012 period, most recoveries of CWT Chinook salmon were Age-3, followed by Age-4, then Age-2.

A complete report on the CWT Tunnel Detector Test is being drafted and should be available for review later in 2013. Clearly, the use of tunnel detectors has the potential to increase the number of CWTs obtained from the bycatch of Chinook salmon and this increases the sampling rate as well. However, to achieve basic statistical goals, CWT sampling must be stratified by area, gear, and time period (Pacific Salmon Commission Coded Wire Tag Workgroup 2008). Estimates of tagged fish harvested in a sample stratum depend on some basic assumptions (Pacific Salmon Commission Coded Wire Tag Workgroup 2008):

1) Sampling in each stratum is representative.

2) The total harvest is known or estimated without bias for the purposes of calculating a sample expansion factor to expand the observed tagged fish to total tagged fish harvested.

3) The sample rate is sufficient to provide an adequate number of tag recoveries to meet statistical criteria to estimate fishery and stock parameters. Currently there is a general criterion that fisheries be sampled at 20% of the catch per strata (Pacific Salmon Commission Coded Wire Tag Workgroup 2008).

NMFS needs to evaluate if the use of tunnel detectors can be practically implemented in the field, and, if so, on what scale and at what cost. Funding would need to be identified to support additional sampling.

The CWT Tunnel Detector Test was designed to be a feasibility study on the practical application of this technology in a processing plant. It was not designed to provide a random, representative sample of the entire Chinook salmon bycatch in the 2012 GOA pollock fishery in this time-area-gear stratum, and the CWT recoveries from the Tunnel Detector Test should not be expanded to Chinook salmon harvested by other vessels fishing in this fishery and delivering to other plants for the purpose of calculating total estimated contributions.

Origins and Distribution of CWT Chinook Salmon in the BSAI

Overall, the majority of CWT Chinook salmon recovered as bycatch in the BSAI originated from British Columbia and Alaska. Recoveries of CWT Chinook salmon in the bycatch of the BSAI groundfish fishery are summarized by state or province of origin (Attachment 6, Table 1). Since 1995, most of the observed CWTs of Chinook salmon in the BSAI fishery have originated from British Columbia (36%) and Alaska (35%), followed by Oregon (17%), Washington (10%), Yukon Territory (3%), and California (<1%). When accounting for CWT mark expansions for each tag code (see Attachment 4, Recovery Estimation Technique), British Columbia provided 61% of CWT Chinook bycatch, followed by Alaska (23%), Oregon (10%), Washington (4%), Yukon Territory (1%), and California (1%). Since the 1992 brood year, the major producing states' release of Chinook salmon (expressed in numbers of juvenile salmon) tagged with CWTs was led by Washington (45%), followed by California (22%), Oregon (14%), British Columbia (10%), Idaho (6%), and Alaska (3%). Based on CWT mark expansions, while 84% of the CWT

Chinook salmon bycatch in the BSAI has originated from British Columbia and Alaska, British Columbia and Alaska together produced only 13% of the CWT Chinook salmon released in the greater Pacific region of North America during this time period.

Starting in 2011, sampling expansion factors can be calculated for CWT recoveries in the bycatch of the Bering Sea pollock fishery, thus allowing calculation of total estimated contributions for stocks of interest. However, few CWTs have been recovered in the BSAI trawl fishery in the last couple years. In the 2011 BSAI trawl fishery, 13 adipose fin-clipped Chinook salmon were collected from the 2,513 fish examined by observers, an adipose-clip rate of 0.5%. Two CWT Chinook salmon were recovered from the 2011 BSAI bycatch, both originating from Washington (Attachment 6, Table 1), leading to a total estimated contribution of Washington-origin Chinook salmon in the 2011 BSAI bycatch of 21.4 fish. In the 2012 BSAI trawl fishery, 6 adipose fin-clipped Chinook salmon were collected from the 1,160 fish examined by observers, an adipose-clip rate of 0.5%. Two CWT Chinook salmon were recovered from the 2012 BSAI bycatch, one originating from Alaska and one from British Columbia origin, leading to a total estimated contribution of 11.7 Alaska-origin Chinook and 65.2 British Columbia-origin Chinook salmon in the 2012 BSAI bycatch. The 2012 CWT summary data should be considered preliminary.

Most of the Chinook salmon with CWTs recovered in the BSAI originated from hatchery production (Attachment 6, Table 2), a reflection of the fact that wild stocks of Chinook salmon are under-represented by CWTs, especially outside of Alaskan production. For Alaska-origin CWT Chinook salmon however, wild stocks increased to 6% of the bycatch of Alaskan stocks in the BSAI since 1995, with hatcheries providing the other 94%. For all the CWT Chinook salmon that have been tagged and released in all locations other than Alaska from the 1992 brood onward, 98% were of hatchery origin, 1% were from wild stocks, and 1% were from mixed stocks. Washington was the only other state of origin with a recovery of a wild stock in the BSAI.

The CWT Chinook salmon recovered in the BSAI comprised a variety of run-types, and the percentage of each run-type varied by state or province of origin (Attachment 6, Table 3). The different designated run-types are determined by the tagging agency. Overall, the most prevalent run-type of CWT Chinook salmon in the BSAI was Fall (41%), followed by Spring (40%), Summer (18%), and small numbers of other run-types. For Alaska stocks, 100% of CWT recoveries were Spring run-type. For British Columbia, the most prevalent run-type was Fall (43%), followed by Summer (37%) and Spring (20%). Washington Chinook were predominantly Fall run-type (76%), followed by Spring (16%), Summer (4%), and Late Fall Upriver Brights (4%). Oregon Chinook were predominantly Fall (69%), followed by Spring (27%), Winter (3%), and Late Fall Upriver Brights (1%). For Yukon Territory, Spring was the most prevalent run-type (50%), followed by Summer (29%), Fall (14%), and Late Fall (7%).

The CWT Chinook salmon recovered in the BSAI from 1995 to 2012 comprised a number of age classes from age-2 to age-6 (Attachment 7, Tables 1). Almost half of the CWT recoveries were from age-3 fish (48%), followed by age-4 (28%), age-2 (17%), age-5 (6%), and age-6 (1%). Ages of CWT recoveries were calculated by subtracting the brood-year of each CWT recovery from the recovery-year to come up with a total-age for each fish. The 1995–2012 age

distributions of CWT Chinook salmon in the BSAI bycatch are similar to the age distributions of CWT Chinook salmon in the GOA bycatch.

Genetic Research and Results on Salmon in the BSAI and GOA

Genetic Analysis of Salmon Bycatch in the BSAI

In 2013, the NMFS AFSC Auke Bay Lab reported genetic stock identification results for a subset of Chinook salmon bycatch samples collected in the Bering Sea from the bycatch of the 2011 groundfish trawl fisheries (Guthrie et al. 2013). Samples were genotyped for the 43 unlinked single-nucleotide polymorphism (SNP) markers represented in the ADF&G genetic baseline. In 2011, the genetic samples were collected as part of the vessel observer's species-composition analysis; therefore, stock composition estimates apply to the sample set and may not represent the entire Chinook salmon bycatch. The majority of the 2,473 Chinook salmon bycatch samples taken in 2011 originated from stocks in Coastal Western Alaska (68%), with smaller contributions from North Alaska Peninsula (9%), British Columbia (8%), and U.S. west coast (6%). The remaining 9% comprised stocks from Northern Alaska Peninsula, Washington, Oregon, and Upper and Middle Yukon River. These estimates are similar to the 2008 to 2010 Chinook salmon bycatch estimates; however, Coastal Western Alaska and North Alaska Peninsula stock compositions trended downward between 2008 and 2010 but increased in 2011 (Attachment 8). Temporal analysis of the samples revealed changes in Chinook salmon stock composition during 2011, with lower contribution of North Alaska Peninsula and Upper Yukon River, and higher concentrations of Coastal Western Alaska Chinook salmon stocks during the B season of the groundfish fishery, compared with the A season.

While changes in sampling protocols between years necessitate caution in comparing annual analyses across years, when the stock compositions were analyzed for 2011, Coastal Western Alaska and Northern Alaska Peninsula stock compositions trended downward between 2008 and 2010 but increased in 2011 (Attachment 8, Figure1). The Yukon River contribution dropped to its lowest levels in 2011, while British Columbia and West Coast U.S. stock compositions continued to trend upward (Attachment 8, Figure 1). In addition, the extent to which any salmon stock is impacted by the bycatch of the Bering Sea trawl fishery is dependent on many factors including (1) the overall size of the bycatch, (2) the age of the salmon caught in the bycatch, (3) the age of the returning salmon, and (4) the total escapement of the affected stocks taking into account lag time for maturity and returning to the river. As such, a higher stock composition estimate one year does not necessarily infer greater impact than a smaller estimate in another year.

Regulations on prohibited species bycatch management at 50 CFR 679.21(f) implemented under Amendment 91, require that all salmon taken as bycatch in the Bering Sea pollock fishery be sorted by species and counted to ensure compliance with the salmon bycatch caps for the pollock fishery. This has provided additional opportunities for observers to provide representative samples from the salmon bycatch for genetic analysis, and improve the capability to characterize the origin of salmon taken as bycatch in the Bering Sea pollock fishery. In 2011, systematic random sampling was employed to take genetic samples from every tenth incidentally caught Chinook salmon from the pollock trawl fishery. The same systematic random sampling methods were applied in 2012.

Genetic Analysis of Salmon Bycatch in the GOA

While genetic and scale pattern derived stock composition analyses have been completed for available sample sets from the Chinook salmon Prohibited Species Catch (PSC) of the BSAI groundfish trawl fisheries (Myers and Rogers 1988; Myers et al. 2004; NMFS 2009a; Guyon et al. 2010a; Guyon et al. 2010b, Guthrie et al. 2013), limited sampling has precluded estimates of stock composition for salmon PSC in the GOA pollock trawl fishery.

For the 2011 genetic analyses, approximately 240 Chinook salmon axillary process samples from the Western GOA were received by the NMFS Auke Bay Lab from the Alaska groundfish fisheries PSC. This represents an overall fraction sampled of 1.7%. The lack of representative samples and small sample sizes preclude calculating statistically reliable stock composition estimates of the 2011 GOA Chinook salmon bycatch as a whole (Guthrie et al. 2013). Samples were genotyped for 43 SNP markers represented in the ADF&G coastwide Chinook salmon baseline. The 2010 and 2011 GOA samples were predominantly from Chinook salmon stocks from the U.S. Pacific Northwest, British Columbia, and coastal southeastern Alaska (Attachment 8, Figure 2). For reasons discussed above, these results provide "presence" indicators of Chinook salmon stocks rather than relative abundance (Guthrie et al. 2013).

Chinook Salmon Management Measures

Bering Sea Management Measures—Amendment 91

Amendment 91 to the BSAI FMP was implemented in September 2010 (75 FR 53026, August 30, 2010), for management of Chinook salmon bycatch in the Bering Sea pollock fishery. Amendment 91 (NMFS 2009b) combines a PSC limit on the amount of Chinook salmon that may be caught incidentally with an incentive plan agreement (IPA) and performance standard designed to minimize bycatch to the extent practicable. Amendment 91 applies only to management of the Bering Sea pollock fishery and does not affect the management of pollock fisheries in the Aleutian Islands. Under Amendment 91, the pollock fleet is prevented from exceeding the 60,000 Chinook salmon PSC limit in every year. Each year, NMFS allocates a portion of the 60,000 Chinook salmon PSC limit to the mothership sector, catcher/processor sector, inshore cooperatives, and Western Alaska Community Development Quota Program groups if an IPA is formed and approved by NMFS. The sector-level performance standard of 47,591 Chinook salmon is a tool to ensure that each sector does not fully harvest its Chinook salmon PSC allocation in most years. For a sector to continue to receive Chinook salmon PSC allocations under the 60,000 Chinook salmon PSC limit, that sector may not exceed its portion of 47,591 in any three years within seven consecutive years. If a sector fails this performance standard, it will permanently be allocated an annual fixed portion of the 47,591 Chinook salmon PSC limit. All vessels choosing to not participate in an IPA would fish under a portion of the "opt-out" cap of 28,496 Chinook salmon PSC limit and would be ineligible to participate in management measures intended to offer flexibility to vessels harvesting pollock. Chinook salmon bycatch in the BSAI has remained well below 47,591 Chinook salmon, since implementation of this program (Attachment 2, Table 1). For more information see http://www.alaskafisheries.noaa.gov/sustainablefisheries/bycatch/salmon/chinook/feis/eis_1209.pdf

GOA Management Measures—Amendment 93

In 2012, Amendment 93 to the GOA FMP was implemented in the GOA to limit the amount of Chinook salmon caught in the pollock fishery (77 FR 42629, July 20, 2012). Amendment 93 establishes separate PSC limits in the Central and Western GOA for Chinook salmon that would cause NMFS to close the directed pollock fishery in the Central or Western regulatory areas of the GOA, if the applicable limit is reached. This action also requires retention of salmon by all vessels in the Central and Western GOA pollock fisheries until the catch is delivered to a processing facility where an observer is provided the opportunity to count the number of salmon and to collect scientific data or biological samples from the salmon.

Under Amendment 93, the Chinook salmon PSC in the Central and Western GOA pollock fisheries is limited to no more than 25,000 salmon. This amount is below the 2007 Incidental Take Statement of 40,000 fish for Chinook salmon in the GOA groundfish fisheries. A component of Amendment 93 requires full retention of salmon species incidentally caught in the Central or Western GOA pollock fisheries, which is a necessary step to facilitate future stock of origin analyses.

GOA Chinook Salmon Measures: Amendment 97

In June 2013, the NPFMC recommended GOA Amendment 97 to reduce catch of Chinook salmon PSC in the Central and Western GOA for all trawl fisheries, except the directed pollock fishery. If approved by the Secretary of Commerce, this recommendation would set an annual Chinook salmon PSC limit of 7,500 in the Central and Western GOA for Chinook salmon, which would close fisheries in those regulatory areas once a limit is attained. An additional PSC buffer would provide an incentive to annually reduce Chinook salmon PSC to less than 6,500 fish annually. Implementation of some of the management measures evaluated in the draft analysis for this item may require an amendment to the GOA FMP, as well as amendments to implementing regulations. Reducing salmon incidental catch continues to be an important issue for the NPFMC, NMFS Alaska Region, western Alaska communities, and the fishing industry. For more information on this proposal, see the NPFMC web site at http://www.alaskafisheries.noaa.gov/npfmc/bycatch-controls/GOA-salmon-bycatch.html.

Observer Restructuring

In all groundfish and halibut fisheries with partial coverage vessels, NMFS implemented a randomized deployment of observers in January 2013 to yield unbiased estimates of total catch and catch composition. This new deployment program may improve estimation of Chinook salmon bycatch in directed pollock fisheries of the GOA. Additional details on the Observer Program are available at http://www.alaskafisheries.noaa.gov/sustainablefisheries/observers/

The new Observer Program continues to incorporate accounting for Chinook salmon bycatch in the Bering Sea groundfish fisheries developed under Amendment 91. These procedures are unchanged.

Preliminary Information on Coded Wire Tags Recovered in 2013

While this report applies to 2012 incidental catch and CWT data, the request for initiation of Section 7 consultation is also influenced by new CWT data. In 2013 an Exempted Fishing Permit was issued for further experimentation on a salmon excluder device, designed to reduce bycatch of Chinook salmon and other salmon species. In the spring of 2013, that experiment captured approximately 378 Chinook salmon, of which two had CWTs from the SRf-r Chinook stock. While these were fish caught during an experiment, they were caught with groundfish trawl gear in the directed commercial fishery. Thus, we believe that these recoveries provide additional evidence to support our consultation request.

Potential effects of the GOA groundfish Fisheries on the SRF-r Chinook Salmon ESA – ESU

While the two SRF-r Chinook salmon are the first occurrence of this ESU recovered in the Alaska groundfish fisheries, the SRF-r Chinook salmon ESU has experienced substantial recovery since listing. The returns of the SRF-r are enumerated at the Lower Granite Dam of the Snake River. Between 2010 and 2012, approximately 36,000 SRF-r Chinook salmon have returned to the Lower Granite Dam, approximately 9,000 of which are attributed to the wild adult proportion of the ESU. The number of the SRF-r ESU taken in the GOA groundfish fishery is likely to be small, in comparison to the increasing numbers of this ESU available to restore the population. We are unable to enumerate SRF-r Chinook salmon in the GOA groundfish fisheries at this time, but will continue to monitor for its presence through CWT analysis of samples collected by observers. Thus, we request re-initiation of ESA section 7 consultation for the GOA groundfish fisheries due to the recovery of two coded-wire tagged Chinook salmon from the Snake River fall-run ESU in 2012 in the GOA pollock fishery.

If you have any questions, please contact Jeff Hartman at jeff.hartman@noaa.gov or 907-586-7442.

Attachments

1. BSAI and GOA groundfish fisheries total Chinook salmon catch 2004–2012
2. Chinook salmon mortality in BSAI groundfish fisheries
3. Chinook salmon mortality in GOA groundfish fisheries
4. Recovery Estimation Technique
5. Number Recovered and Mark Expansion of ESA-listed CWT Chinook salmon by ESU 1984–2012 GOA and BSAI trawl fisheries (pre and post listing; and run)
6. Number and Mark Expansion of CWT Chinook salmon recovered in the bycatch of the BSAI groundfish fishery by rearing type, run year, and state or province of origin, 1995–2012
7. Age structure of CWT Chinook salmon recovered in the bycatch of the BSAI and GOA groundfish fisheries, 1995–2012, excluding all stocks of Alaska origin
8. Comparison of yearly stock composition estimates (2008–2011) based on available genetic samples from the Bering Sea and GOA Chinook salmon bycatch
9. Number and Mark Expansion of CWT Chinook salmon recovered in the bycatch of the GOA groundfish fisheries by run year, rearing type, and state or province of origin, 1995 through 2012

cc:
Peter Dygert, NMFS NW Region, Sustainable Fisheries Division
Susan Bishop, NMFS NW Region, Sustainable Fisheries Division
Chris Oliver, NPFMC
Doug DeMaster, NMFS AFSC
Phil Mundy, NMFS AFSC
Adrian Celewycz, NMFS AFSC
Jeff Guyon, NMFS AFSC
Martin Loefflad, NMFS AFSC
Lew Queirolo, NMFS AK Region

Literature Cited

ADF&G Chinook Salmon Research Team. 2013. Chinook salmon stock assessment and research plan, 2013. Alaska Department of Fish and Game, Special Publication No. 13-01, Anchorage. 56 p. (Available at http://www.adfg.alaska.gov/index.cfm?adfg=chinook_efforts_symposium.research_plan).

Guyon, J.R., Guthrie, C.M., and Nguyen, H. 2010a. Genetic Stock Composition Analysis of Chinook Salmon Bycatch Samples from the 2008 Bering Sea Pollock Fishery, Report to the North Pacific Fisheries Management Council. (Juneau, AK, National Marine Fisheries Service, Alaska Fisheries Science Center, Auke Bay Laboratories), pp. 32.

Guyon, J.R., Guthrie, C.M., and Nguyen, H. 2010b. Genetic Stock Composition Analysis of Chinook Salmon Bycatch Samples from the 2007 "B" Season and 2009 Bering Sea Trawl Fisheries, Report to the North Pacific Fisheries Management Council. (Juneau, AK, National Marine Fisheries Service, Alaska Fisheries Science Center, Auke Bay Laboratories), pp. 10.

Guthrie, C. M. III, H. T. Nguyen, and J. R. Guyon. 2013. Genetic stock composition analysis of Chinook salmon bycatch samples from the 2010 Bering Sea trawl fisheries. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-232, 22 p.

Johnson, K.J. 2004. Regional overview of coded wire tagging of anadromous salmon and steelhead in Northwest America: Regional Mark Processing Center, Pacific States Marine Fisheries Commission, Portland, Oregon.

Joint Columbia River Management Staff. 2013. 2013 Joint staff report: stock status and fisheries for spring Chinook, summer Chinook, Sockeye, Steelhead, and other species, and miscellaneous regulations. Oregon Department of Fish & Wildlife, Washington Department of Fish & Wildlife. 88 p. (Available at http://wdfw.wa.gov/publications/01452/wdfw01452.pdf).

Josephson, R. 2012. Alaska Department of Fish and Game, PO Box 115526, Juneau, AK 99811 (Ron.Josephson@ALASKA.GOV). Personal communication, October 17, 2012.

LaVoy, L. 2013a. NOAA Fisheries (Larrie.Lavoy@NOAA.GOV). Personal communication, March 28, 2013.

LaVoy, L. 2013b. NOAA Fisheries (Larrie.Lavoy@NOAA.GOV). Personal communication, March 12, 2013.

Myers, K.W., Walker, R.V., Armstrong, J.L., Davis, N.D., and Patton, W.S. 2004. Stock Origins of Chinook Salmon in Incidental Catches by Groundfish Fisheries in the Eastern Bering Sea, 1997–1999. North Pacific Anadromous Fish Commission Technical Report No 5, 74-75.

Myers, K.W., and D.E. Rogers. 1988. Stock origins of Chinook salmon in incidental catches by groundfish fisheries in the eastern Bering Sea. N. Am. J. Fish. Mgmt. 8: 161– 171.

Nandor, G.F., Longwill, J.R., Webb, D.L. 2010. Overview of the coded wire tag program in the Greater Pacific Region of North America, in Wolf, K.S. and O'Neal, J.S., eds., PNAMP Special Publication: Tagging, Telemetry and Marking Measures for Monitoring Fish Populations—A compendium of new and recent science for use in informing technique and decision modalities: Pacific Northwest Aquatic Monitoring Partnership Special Publication 2010-002, chap. 2, p. 5–46.

NMFS (National Marine Fisheries Service). 2012. Supplemental Biological Opinion on the Re-initiation of Endangered Species Act Section 7 Consultation on Incidental Catches of Chinook Salmon in the Gulf of Alaska Groundfish Fisheries. January 9, 2012. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.

NMFS 2011. Secretarial Review Draft Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Chinook Salmon Prohibited Species Catch in the Gulf of Alaska Pollock Fishery. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Regional Office, Juneau, AK.

NMFS 2009a. Supplemental Biological Opinion Reinitiating Consultation on the January 11, 2007 Biological Opinion regarding Authorization of Bering Sea/Aleutian Islands (BSAI) Groundfish Fisheries. December 2, 2009. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.

NMFS. 2009b. Bering Sea Chinook salmon bycatch management–Volume 1, Final Environmental Impact Statement, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Alaska Regional Office, Juneau, AK.

NMFS. 2007. Supplemental Biological Opinion Reinitiating Consultation on the November 30, 2000 Biological Opinion regarding Authorization of Bering Sea/Aleutian Islands Groundfish Fisheries. January 11, 2007. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.

Pacific Salmon Commission Coded Wire Tag Workgroup. 2008. An action plan in response to Coded Wire Tag (CWT) Expert Panel Recommendations. Pacific Salmon Comm. Tech. Rep. No. 25: 170 p.

Pella, J.J., and H.J. Geiger. 2009 Sampling considerations for estimating geographic origins of Chinook salmon bycatch in the Bering Sea pollock fishery. Alaska Department of Fish and Game, Special Publication No. 09-08, Anchorage.

Vaughan, J. 2011. Memorandum from Jay Vaughan to Adrian Celewycz, Production of stream type Chinook salmon from ESA-listed ESUs originating in Washington, Oregon, and Idaho. August 19, 2001. National Marine Fisheries Service.

Vaughan, J. 2013. Memorandum from Jay Vaughan to Adrian Celewycz. Database of CWT release groups of ESA listed salmon and steelhead . January 22, 2013. National Marine Fisheries Service.

Attachment 1

Table 1. BSAI groundfish fisheries total Chinook salmon catch compared against total groundfish catch: 2004–2012*

BSAI Chinook Count			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	48,733	67,362	82,695	121,770	21,481	12,406	9,693	25,499	11,344
	Non-Pelagic	Pacific Cod Target	5,599	3,764	3,620	6,287	2,063	1,054	1,256	446	931
		Flatfish	2,166	2,950	725	1,169	246	166	636	19	175
		Other Targets	404	135	13	279	308	354	883	644	438
Non-Trawl Gear		All Targets	57	56	31	74	10	11	12	62	56
TOTAL			**56,960**	**74,266**	**87,084**	**129,579**	**24,107**	**13,990**	**12,479**	**26,670**	**12,944**

BSAI Groundfish			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	1,452,486	1,461,803	1,474,864	1,341,395	980,866	810,475	803,513	1,199,034	1,204,378
	Non-Pelagic	Pacific Cod Target	109,816	81,230	85,564	93,077	43,859	38,238	36,938	44,549	53,932
		Flatfish	180,893	192,555	194,683	217,734	293,334	245,561	277,416	310,371	324,734
		Other Targets	75,530	78,422	80,320	85,251	83,688	99,496	100,458	86,259	79,280
Non-Trawl Gear		All Targets	160,425	167,103	146,677	122,831	144,323	143,798	136,863	178,038	196,490
TOTAL			**1,979,151**	**1,981,113**	**1,982,108**	**1,860,289**	**1,546,070**	**1,337,568**	**1,355,187**	**1,818,251**	**1,858,814**

BSAI Chinook Rate			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	0.034	0.046	0.056	0.091	0.022	0.015	0.012	0.021	0.009
	Non-Pelagic	Pacific Cod Target	0.051	0.046	0.042	0.068	0.047	0.028	0.034	0.010	0.017
		Flatfish	0.012	0.015	0.004	0.005	0.001	0.001	0.002	0.000	0.001
		Other Targets	0.005	0.002	0.000	0.003	0.004	0.004	0.009	0.007	0.006
Non-Trawl Gear		All Targets	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
TOTAL			**0.029**	**0.037**	**0.044**	**0.070**	**0.016**	**0.010**	**0.009**	**0.015**	**0.007**

*2012 data are preliminary
Source: NMFS Alaska Region Catch Accounting System: 3/20/2013

Table 2. GOA groundfish fisheries total Chinook salmon catch compared against total groundfish catch: 2004–2012*

Gulf of Alaska Chinook Count			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	12,506	26,631	15,564	35,127	10,667	2,916	42,885	12,485	18,568
		Other Targets	-	63	6	304	726	126	148	59	603
	Non-Pelagic	Pollock Target	908	41	882	624	436	111	435	1,351	279
		Pacific Cod Target	2,800	2,853	1,909	2,654	2,804	3,784	7,750	4,485	519
		Flatfish	885	387	263	1,732	1,514	1,181	1,448	1,042	1,584
		Other Targets	646	1,296	380	50	30	278	1,893	1,347	1,029
Non-Trawl Gear		All Targets	32	-	-	47	-	-	-	-	-
TOTAL			**17,777**	**31,270**	**19,004**	**40,539**	**16,176**	**8,397**	**54,559**	**20,769**	**22,582**

Gulf of Alaska Groundfish			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	57,984	83,218	73,225	52,832	47,182	39,558	74,743	72,908	99,623
		Other Targets	977	1,433	3,497	4,647	4,522	3,381	4,743	4,123	4,452
	Non-Pelagic	Pollock Target	7,195	897	3,259	1,351	3,556	1,921	2,994	9,217	3,576
		Pacific Cod Target	16,785	12,443	11,403	13,590	22,857	8,736	17,230	13,945	20,201
		Flatfish	20,449	29,622	41,313	42,572	47,085	52,052	42,619	45,017	32,543
		Other Targets	26,094	21,884	22,149	20,337	20,452	22,579	24,203	20,464	23,626
Non-Trawl Gear		All Targets	59,180	50,758	53,912	54,101	56,181	55,019	71,117	84,022	74,125
TOTAL			**188,664**	**200,254**	**208,758**	**189,429**	**201,835**	**183,246**	**237,649**	**249,695**	**258,146**

Gulf of Alaska Chinook Rate			2004	2005	2006	2007	2008	2009	2010	2011	2012
Trawl Gear	Pelagic	Pollock Target	0.216	0.320	0.213	0.665	0.226	0.074	0.574	0.171	0.186
		Other Targets	-	0.044	0.002	0.065	0.161	0.037	0.031	0.014	0.135
	Non-Pelagic	Pollock Target	0.126	0.045	0.271	0.462	0.123	0.058	0.145	0.147	0.078
		Pacific Cod Target	0.167	0.229	0.167	0.195	0.123	0.433	0.450	0.322	0.026
		Flatfish	0.043	0.013	0.006	0.041	0.032	0.023	0.034	0.023	0.049
		Other Targets	0.025	0.059	0.017	0.002	0.001	0.012	0.078	0.066	0.044

*2012 data are preliminary
Source: NMFS Alaska Region Catch Accounting System: 3/20/2013

Attachment 2

Table 1. Chinook salmon mortality in BSAI groundfish fisheries

Year	Annual with CDQ	Annual without CDQ	Annual CDQ only	A season with CDQ	B season with CDQ	A season without CDQ	B season without CDQ	A season CDQ only	B season CDQ only
1991	na	48,880	na	na	na	46,392	2,488	na	na
1992	41,955	na	na	31,419	10,536	na	Na	na	na
1993	46,014	na	na	24,688	21,326	na	Na	na	na
1994	43,821	40,635	3,186	38,921	4,900	36,699	3,936	2,223	963
1995	23,436	21,430	2,006	18,939	4,497	18,284	3,146	655	1,351
1996	63,205	60,802	2,402	43,316	19,868	42,028	18,n4	1,289	1,114
1997	50,530	48,050	2,481	16,401	34,129	14,905	33,144	1,496	985
1998	55,431	50,313	5,118	18,930	36,501	17,991	32,322	939	4,179
1999	14,599	12,937	1,662	8,794	5,805	8,205	4,732	589	1,073
2000	8,223	7,474	749	6,568	1,655	6,138	1,336	430	319
2001	40,547	37,986	2,561	24,871	15,676	23,093	14,893	1,778	783
2002	39,684	37,581	2,103	26,277	13,407	24,859	12,722	1,418	685
2003	53,571	50,858	2,713	40,044	13,527	38,249	12,609	1,795	918
2004	59,984	56,957	3,007	30,716	29,248	29,587	27,370	1,129	1,878
2005	74,266	72,226	2,040	33,633	40,632	32,334	39,891	1,299	741
2006	87,084	85,290	1,794	62,582	24,502	60,974	24,316	1,608	186
2007	129,568	123,903	5,666	n,119	52,450	74,003	49,900	3,116	2,550
2008	24,105	23,387	718	18,996	5,109	18,391	4,996	605	113
2009	13,796	13,293	503	11,010	2,786	10,596	2,697	414	89
2010	12,383	12,048	335	9,466	2,917	9,131	2,917	335	0
2011	26,672	25,908	784	7,652	19,020	7,222	18,686	430	334
2012	12,947	12,569	378	8,993	3,954	8,649	3,920	344	34
2013	7,578	7,158	420	7,578	0	7,158		420	

Table 2. Chinook salmon mortality In BS pollock directed fisheries.

Year	Annual with CDQ	Annual without CDQ	Annual CDQ only	A season with CDQ	B season with CDQ	A season without CDQ	B season without CDQ	A season CDQ only	B season CDQ only
1991	na	40,906	na	na	na	38,791	2,114	na	na
1992	35,950	na	na	25,691	10,259	na	Na	na	na
1993	38,516	na	na	17,264	21,252	na	Na	na	na
1994	33,136	30,593	2,543	28,451	4,686	26,871	3,722	1,580	963
1995	14,984	12,978	2,006	10,579	4,405	9,924	3,053	655	1,351
1996	55,623	53,220	2,402	36,068	19,554	34,780	18,441	1,289	1,114
1997	44,909	42,437	2,472	10,935	33,973	9,449	32,989	1,487	985
1998	51,322	46,205	5,118	15,193	36,130	14,253	31,951	939	4,179
1999	11,978	10,381	1,597	6,352	5,627	5,768	4,614	584	1,013
2000	4,961	4,242	719	3,422	1,539	2,992	1,250	430	289
2001	33,444	30,937	2,507	18,484	14,961	16,711	14,227	1,773	734
2002	34,495	32,402	2,093	21,794	12,701	20,378	12,024	1,416	677
2003	45,586	43,021	2,565	32,609	12,9n	30,916	12,105	1,693	872
2004	51,696	48,733	2,963	23,093	28,603	21,964	26,769	1,129	1,834
2005	67,362	65,445	1,916	27,331	40,030	26,032	39,413	1,299	617
2006	82,695	80,954	1,741	58,391	24,304	56,806	24,149	1,585	156
2007	121,770	116,128	5,642	69,420	52,350	66,307	49,821	3,113	2,529
2008	21,480	20,839	641	16,638	4,842	16,033	4,806	605	36
2009	12,369	11,922	447	9,711	2,658	9,353	2,569	358	89
2010	9,697	9,362	335	7,630	2,067	7,295	2,067	335	0
2011	25,499	24,735	764	7,137	18,362	6,707	18,028	430	334
2012	11,352	11,003	349	7,774	3,578	7,430	3,573	344	5
2013	6,602	6,182	420	6,602	0	6,182		420	

Notes: Updated 3/25/13

Starting in 2011, the sampling method for salmon in BS pollock directed fisheries changed to census counts
Non-CDQ data for 1991–2002 from blend program database (bsahalx.dbf)
Non-CDQ data for 2003–2010 from Catch Accounting System database (akfish_v_gg_pscnq_estimate)
Non-CDQ data for 2011–2012 from Catch Accounting System database (akfish_v_gg_txn_primary_psc)
CDQ data for 1992–1997 from blend program database (bsahalx.dbf)
CDQ data for 1998 from blend program database (boatrate.dbf)
CDQ data for 1999–2007 from CDQ catch report database (akfish_v_cdq_catch_report_total_catch)
CDQ data for 2008–2010 from Catch Accounting System database (akfish_v_gg_pscnq_estimate_cdq)
CDQ data for 2011–2012 from Catch Accounting System database (akfish_v_gg_txn_primary_psc)
A season: January 1 to June 10; B season: June 11 to December 31
For specific pollock season dates by year, see (http://www.alaskafisheries.noaa.gov/sustainablefisheries/inseason/bsai_fishing_seasons.pdf)
Source: NMFS Alaska Region Catch Accounting System: 3/25/2013

Attachment 3

Chinook salmon bycatch (numbers of salmon) by quarter from 1991 to 2013 in the GOA pollock and other non-pollock groundfish fisheries.

	Pollock Fishery						other
Year	Annual Total	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual	non-pollock
1991	38,894	3,239	538	1,799	2,862	8,439	30,455
1992	16,787	2,289	2,663	1,457	1,801	8,210	8,578
1993	19,260	6,499	157	2,730	4,192	13,578	5,682
1994	13,615	3,685	88	1,973	1,474	7,219	6,396
1995	14,652	1,408	32	2,342	1,136	4,917	9,735
1996	15,761	4,802	57	6,421	100	11,380	4,381
1997	15,230	4,622	48	4,742	30	9,443	5,787
1998	16,984	1,672	1	8,550	4,005	14,228	2,755
1999	30,600	10,408	35	5,981	10,003	26,428	4,173
2000	26,729	4,298	2,313	9,744	2,058	18,413	8,317
2001	15,104	4,204	3,107	754	1,466	9,531	5,573
2002	12,920	1,505	640	553	2,463	5,161	7,758
2003	15,396	765	389	948	2,298	4,400	10,995
2004	17,777	3,632	2,176	2,207	5,137	13,152	4,625
2005	31,270	11,100	5,123	1,076	10,629	27,927	3,343
2006	18,795	2,918	4,292	4,652	3,875	15,738	3,058
2007	40,610	1,487	28,468	1,303	3,957	35,215	5,395
2008	16,112	578	7,682	388	1,984	10,633	5,480
2009	8,397	718	1,410	656	412	3,195	5,202
2010	54,621	4,976	2,039	4,864	32,929	44,808	9,813
2011	21,724	1,716	1,259	1,508	10,304	14,787	6,937
2012	22,550	2,907	867	6,012	9,062	18,847	3,703
2013	14,337	4,316	993			5,309	9,028

1991 - 2002: Blend data. Week end date was used to determine quarters.
Week end dates do not always match quarter dates.
2003 - Current: Catch Accounting System.
Due to changes in regulatory pollock season dates from 1991 to 2001 and to match current pollock season dates, data were grouped by quarter.
First Quarter: Jan 1 - Feb 28
Second Quarter: Mar 1 - May 31
Third Quarter: Jun 1 - Sep 30
Fourth Quarter: Oct 1 - Dec 31
Updated 5/30/2013

Attachment 4

Recovery Estimation Technique

The total number of fish from a particular release group that are caught in a particular area during a particular time period can be estimated in a two-step process (Nandor et al. 2010). The first step is to calculate a sampling expansion factor (a) for the fishery in each year (Johnson 2004):

> a = (total catch of each species by fishery by year) / (sampled catch of each species by fishery by year).

A sampling expansion factor can only be calculated from CWTs recovered from *inside* a sample where the number of sampled fish is known. CWT recoveries from *outside* the sample ("select" recoveries where the total number of fish examined is unknown) cannot be used to calculate a sampling expansion factor.

For the sampled catch, the estimated total recoveries of tags for each release group of interest by fishery and year are calculated:

$$R_{Ti} = aR_{Oi};$$

R_{Ti} = estimated total recoveries of tags for the i^{th} release group;
R_{Oi} = observed number of tags for the i^{th} release group release group;
a = sampling expansion factor for each fishery in each year.

The second step is to account for the fraction of each release group of interest that was tagged (Johnson 2004):

$$C_T = \sum_{i=1}^{n} b_i R_{Ti};$$

C_T = the total estimated contribution for a release group of interest;
b_i = a CWT marking expansion factor for the i^{th} release group = (total fish released)/ (total fish marked) for the i^{th} release group;
R_{Ti} = estimated total recoveries of tags for the i^{th} release group.

The contribution estimates are then summed over all relevant area and time strata. These are the simplest forms of recovery expansion equations (Nandor, et. al. 2010).

For ESA-listed ESUs, the CWT mark expansion factor can be additionally expanded to take into account the untagged, wild component of each ESU that is not represented by CWTs. A total mark expansion factor (c_j) for each ESU can be calculated:

> c_j = 1 / (proportion hatchery component for the j^{th} ESU).

The proportion hatchery component is calculated separately for each ESU based on the mean hatchery/wild ratio of a number of years of adult returns for each ESU (Appendix Table 1). The total estimated mark expansion of recoveries (R_{TMEj}) can be calculated:

$$R_{TMEij} = c_j \, b_{ij} \, ;$$

R_{TMEij} = the total estimated mark expansion for the i^{th} release group in the j^{th} ESU;
c_j = 1 / (proportion hatchery component for the j^{th} ESU);
b_{ij} = the CWT marking expansion for the i^{th} release group in the j^{th} ESU.

Once again, the contribution estimates are then summed over all relevant area and time strata. For these calculations, each tag code is considered to be a separate release group.

Appendix Table 1. Percentages of hatchery and wild components and Total Mark Expansion Factors for Chinook salmon ESUs.

Chinook salmon ESU name	% Hatchery	% Wild	Total Mark Expansion Factor	Source of hatchery/wild ratios
Lower Columbia River	88.9	11.1	1.12	2008-2010 adult return estimates[1]
Puget Sound	95.0	5.0	1.05	Recent adult return estimates[2]
Snake River fall-run	75.2	24.8	1.33	2007-2011 spawning escapement estimates[3]
Snake River spring/summer-run	73.2	26.8	1.37	1995-2012 adult return estimates[4]
Upper Columbia River spring-run	89.1	10.9	1.12	1995-2012 adult return estimates[4]
Upper Willamette River	81.7	18.3	1.22	2005-2010 adult return estimates[1]

[1] Vaughan 2011.
[2] LaVoy 2013a.
[3] LaVoy 2013b.
[4] Joint Columbia River Management Staff 2013.

Attachment 5

Table 1. Number and mark expansion of ESA-listed CWT salmon by ESU recovered in the bycatch of the GOA and BSAI groundfish fisheries, summed over pre-listing and post-listing periods, 1984–2012.

		GOA			BSAI		
Listing status	Chinook Salmon ESU_name	Number Recovered	CWT Mark Expansion	Total Mark Expansion	Number Recovered	CWT Mark Expansion	Total Mark Expansion
Pre-listing	Lower Columbia River	12	82.1	92.0	0	0.0	0.0
	Upper Willamette River	40	129.7	158.2	2	2.0	2.4
Post-listing	Lower Columbia River	11	29.8	33.4	9	9.1	10.2
	Snake River fall-run	2	3.0	4.0	0	0.0	0.0
	Upper Willamette River	69	202.4	246.9	10	60.0	73.2
	Upper Columbia River spring	1	1.0	1.1	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5 continued

Table 2. Number and mark expansion of ESA-listed CWT salmon recovered in the GOA and BSAI groundfish fisheries by ESU by year.

A. Lower Columbia River Chinook ESU

		GOA			BSAI		
Listing status	run_year	Number Recovered	CWT Mark Expansion	Total Mark Expansion	Observed Number	CWT Mark Expansion	Total Mark Expansion
Pre-listing	1984	5	14.1	15.8	0	0.0	0.0
	1985	1	1.0	1.1	0	0.0	0.0
	1986	0	0.0	0.0	0	0.0	0.0
	1987	1	1.3	1.5	0	0.0	0.0
	1988	0	0.0	0.0	0	0.0	0.0
	1989	0	0.0	0.0	0	0.0	0.0
	1990	1	1.0	1.1	0	0.0	0.0
	1991	0	0.0	0.0	0	0.0	0.0
	1992	1	1.6	1.8	0	0.0	0.0
	1993	1	60.3	67.5	0	0.0	0.0
	1994	2	2.8	3.1	0	0.0	0.0
	1995	0	0.0	0.0	0	0.0	0.0
	1996	0	0.0	0.0	0	0.0	0.0
Post-listing	1997	0	0.0	0.0	0	0.0	0.0
	1998	2	18.8	21.1	0	0.0	0.0
	1999	4	5.9	6.6	0	0.0	0.0
	2000	2	2.0	2.2	0	0.0	0.0
	2001	2	2.0	2.2	1	1.0	1.1
	2002	0	0.0	0.0	1	1.0	1.1
	2003	0	0.0	0.0	0	0.0	0.0
	2004	1	1.1	1.2	3	3.0	3.4
	2005	0	0.0	0.0	3	3.1	3.5
	2006	0	0.0	0.0	1	1.0	1.1
	2007	0	0.0	0.0	0	0.0	0.0
	2008	0	0.0	0.0	0	0.0	0.0
	2009	0	0.0	0.0	0	0.0	0.0
	2010	0	0.0	0.0	0	0.0	0.0
	2011	0	0.0	0.0	0	0.0	0.0
	2012	0	0.0	0.0	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5, Table 2 continued

Table 2. Number and mark expansion of ESA-listed CWT salmon recovered in the GOA and BSAI groundfish fisheries by ESU by year.

B. Snake River fall-run Chinook

		GOA			BSAI		
Listing status	run_year	Number Recovered	CWT Mark Expansion	Total Mark Expansion	Number Recovered	CWT Mark Expansion	Total Mark Expansion
Pre-listing	1984	0	0.0	0.0	0	0.0	0.0
	1985	0	0.0	0.0	0	0.0	0.0
	1986	0	0.0	0.0	0	0.0	0.0
	1987	0	0.0	0.0	0	0.0	0.0
	1988	0	0.0	0.0	0	0.0	0.0
Post-listing	1989	0	0.0	0.0	0	0.0	0.0
	1990	0	0.0	0.0	0	0.0	0.0
	1991	0	0.0	0.0	0	0.0	0.0
	1992	0	0.0	0.0	0	0.0	0.0
	1993	0	0.0	0.0	0	0.0	0.0
	1994	0	0.0	0.0	0	0.0	0.0
	1995	0	0.0	0.0	0	0.0	0.0
	1996	0	0.0	0.0	0	0.0	0.0
	1997	0	0.0	0.0	0	0.0	0.0
	1998	0	0.0	0.0	0	0.0	0.0
	1999	0	0.0	0.0	0	0.0	0.0
	2000	0	0.0	0.0	0	0.0	0.0
	2001	0	0.0	0.0	0	0.0	0.0
	2002	0	0.0	0.0	0	0.0	0.0
	2003	0	0.0	0.0	0	0.0	0.0
	2004	0	0.0	0.0	0	0.0	0.0
	2005	0	0.0	0.0	0	0.0	0.0
	2006	0	0.0	0.0	0	0.0	0.0
	2007	0	0.0	0.0	0	0.0	0.0
	2008	0	0.0	0.0	0	0.0	0.0
	2009	0	0.0	0.0	0	0.0	0.0
	2010	0	0.0	0.0	0	0.0	0.0
	2011	0	0.0	0.0	0	0.0	0.0
	2012	2	3.0	4.0	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5, Table 2 continued

Table 2. Number and mark expansion of ESA-listed CWT salmon recovered in the GOA and BSAI groundfish fisheries by ESU by year.

C. Upper Columbia River spring Chinook ESU

		GOA			BSAI		
Listing status	run_year	Number Recovered	CWT Mark Expansion	Total Mark Expansion	Number Recovered	CWT Mark Expansion	Total Mark Expansion
Pre-listing	1984	0	0.0	0.0	0	0.0	0.0
	1985	0	0.0	0.0	0	0.0	0.0
	1986	0	0.0	0.0	0	0.0	0.0
	1987	0	0.0	0.0	0	0.0	0.0
	1988	0	0.0	0.0	0	0.0	0.0
	1989	0	0.0	0.0	0	0.0	0.0
	1990	0	0.0	0.0	0	0.0	0.0
	1991	0	0.0	0.0	0	0.0	0.0
	1992	0	0.0	0.0	0	0.0	0.0
	1993	0	0.0	0.0	0	0.0	0.0
	1994	0	0.0	0.0	0	0.0	0.0
	1995	0	0.0	0.0	0	0.0	0.0
	1996	0	0.0	0.0	0	0.0	0.0
Post-listing	1997	0	0.0	0.0	0	0.0	0.0
	1998	1	1.0	1.1	0	0.0	0.0
	1999	0	0.0	0.0	0	0.0	0.0
	2000	0	0.0	0.0	0	0.0	0.0
	2001	0	0.0	0.0	0	0.0	0.0
	2002	0	0.0	0.0	0	0.0	0.0
	2003	0	0.0	0.0	0	0.0	0.0
	2004	0	0.0	0.0	0	0.0	0.0
	2005	0	0.0	0.0	0	0.0	0.0
	2006	0	0.0	0.0	0	0.0	0.0
	2007	0	0.0	0.0	0	0.0	0.0
	2008	0	0.0	0.0	0	0.0	0.0
	2009	0	0.0	0.0	0	0.0	0.0
	2010	0	0.0	0.0	0	0.0	0.0
	2011	0	0.0	0.0	0	0.0	0.0
	2012	0	0.0	0.0	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 5, Table 2 continued

Table 2. Number and mark expansion of ESA-listed CWT salmon recovered in the GOA and BSAI groundfish fisheries by ESU by year.

D. Upper Willamette River Chinook ESU

		GOA			BSAI		
Listing status	run_year	Number Recovered	CWT Mark Expansion	Total Mark Expansion	Number Recovered	CWT Mark Expansion	Total Mark Expansion
Pre-listing	1984	11	16.8	20.5	1	1.0	1.2
	1985	0	0.0	0.0	0	0.0	0.0
	1986	0	0.0	0.0	0	0.0	0.0
	1987	0	0.0	0.0	0	0.0	0.0
	1988	0	0.0	0.0	0	0.0	0.0
	1989	0	0.0	0.0	0	0.0	0.0
	1990	4	4.0	4.9	0	0.0	0.0
	1991	1	13.3	16.2	0	0.0	0.0
	1992	4	28.5	34.8	0	0.0	0.0
	1993	14	52.1	63.6	0	0.0	0.0
	1994	3	8.8	10.7	0	0.0	0.0
	1995	2	4.9	6.0	0	0.0	0.0
	1996	1	1.3	1.6	1	1.0	1.2
Post-listing	1997	1	7.5	9.2	0	0.0	0.0
	1998	4	30.7	37.5	0	0.0	0.0
	1999	20	49.3	60.1	1	1.0	1.2
	2000	16	16.6	20.3	1	1.0	1.2
	2001	7	7.1	8.7	1	1.0	1.2
	2002	1	1.0	1.2	2	12.4	15.1
	2003	1	5.3	6.5	0	0.0	0.0
	2004	1	5.8	7.1	1	7.9	9.6
	2005	0	0.0	0.0	2	10.9	13.3
	2006	1	1.0	1.2	0	0.0	0.0
	2007	0	0.0	0.0	0	0.0	0.0
	2008	1	6.5	7.9	0	0.0	0.0
	2009	1	1.8	2.2	1	10.2	12.4
	2010	3	12.8	15.6	1	15.5	18.9
	2011	2	13.4	16.3	0	0.0	0.0
	2012	10	43.6	53.2	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 5 continued

Table 3. Number and mark expansion of ESA-listed CWT salmon recovered in GOA research surveys, post-listing, 1991–2012. No ESUs were ever captured in GOA research surveys pre-listing, and no ESA-listed CWT salmon have been recovered in BSAI research surveys.

		GOA		
Listing status	ESU_name	Number Recovered	CWT Mark Expansion	Total Mark Expansion
Post-listing	Lower Columbia River Chinook	3	6.5	7.2
	Puget Sound Chinook	1	1.0	1.1
	Snake River spring/summer Chinook	5	9.3	12.7
	Upper Columbia River spring Chinook	4	4.1	4.6
	Upper Willamette River Chinook	12	73.0	89.1
	Snake River Basin steelhead	1	1.0	unknown

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Table 4. Number and mark expansion of ESA-listed CWT salmon recovered in GOA research surveys by ESU, by run year, post-listing, 1991–2012. No ESUs were ever captured in GOA research surveys pre-listing, and no ESA-listed CWT salmon have been recovered in BSAI research surveys.

A. Lower Columbia River Chinook ESU			**GOA**		
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**	**Total Mark expansion**
Post-listing	Lower Columbia River Chinook	1997	0	0.0	0.0
		1998	1	4.5	5.0
		1999	1	1.0	1.1
		2000	0	0.0	0.0
		2001	1	1.0	1.1
		2002	0	0.0	0.0
		2003	0	0.0	0.0
		2004	0	0.0	0.0
		2005	0	0.0	0.0
		2006	0	0.0	0.0
		2007	0	0.0	0.0
		2008	0	0.0	0.0
		2009	0	0.0	0.0
		2010	0	0.0	0.0
		2011	0	0.0	0.0
		2012	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5 continued

Table 4. Number and mark expansion of ESA-listed CWT salmon recovered in GOA research surveys by ESU, by run year, post-listing, 1991–2012. No ESUs were ever captured in GOA research surveys pre-listing, and no ESA-listed CWT salmon have ever been recovered in BSAI research surveys..

B. Puget Sound Chinook ESU			GOA		
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**	**Total Mark expansion**
Post-listing	Snake River spring/summer Chinook	1992	0	0.0	0.0
		1993	0	0.0	0.0
		1994	0	0.0	0.0
		1995	0	0.0	0.0
		1996	0	0.0	0.0
		1997	0	0.0	0.0
		1998	0	0.0	0.0
		1999	0	0.0	0.0
		2000	0	0.0	0.0
		2001	0	0.0	0.0
		2002	0	0.0	0.0
		2003	1	1.0	1.1
		2004	0	0.0	0.0
		2005	0	0.0	0.0
		2006	0	0.0	0.0
		2007	0	0.0	0.0
		2008	0	0.0	0.0
		2009	0	0.0	0.0
		2010	0	0.0	0.0
		2011	0	0.0	0.0
		2012	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5, Table 4 continued

Table 4. Number and mark expansion of ESA-listed CWT salmon recovered in GOA research surveys by ESU, by run year, post-listing, 1992–2012. No ESUs were captured in GOA research surveys pre-listing, and no ESA-listed CWT salmon have been recovered in BSAI research surveys.

C. Snake River spring/summer Chinook ESU			GOA		
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**	**Total Mark expansion**
Post-listing	Snake River spring/summer Chinook	1992	0	0.0	0.0
		1993	0	0.0	0.0
		1994	0	0.0	0.0
		1995	0	0.0	0.0
		1996	0	0.0	0.0
		1997	0	0.0	0.0
		1998	1	2.9	4.0
		1999	0	0.0	0.0
		2000	0	0.0	0.0
		2001	0	0.0	0.0
		2002	1	1.1	1.5
		2003	3	5.3	7.3
		2004	0	0.0	0.0
		2005	0	0.0	0.0
		2006	0	0.0	0.0
		2007	0	0.0	0.0
		2008	0	0.0	0.0
		2009	0	0.0	0.0
		2010	0	0.0	0.0
		2011	0	0.0	0.0
		2012	0	0.0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5, Table 4 continued

Table 4. Number and mark expansion of ESA-listed CWT salmon recovered in GOA research surveys by ESU, by run year, post-listing, 1991–2012. No ESUs were recovered in GOA research surveys pre-listing, and no ESA-listed CWT salmon have been recovered in BSAI research surveys.

D. Upper Columbia River spring Chinook ESU			GOA		
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**	**Total Mark expansion**
Post-listing	Upper Columbia River spring Chinook	1999	1	1.0	1.1
		2000	2	2.1	2.4
		2001	0	0.0	0.0
		2002	0	0.0	0.0
		2003	1	1.0	1.1
		2004	0	0.0	0.0
		2005	0	0.0	0.0
		2006	0	0.0	0.0
		2007	0	0.0	0.0
		2008	0	0.0	0.0
		2009	0	0.0	0.0
		2010	0	0.0	0.0
		2011	0	0.0	0.0
		2012	0	0.0	0.0

E. Upper Willamette River Chinook ESU			GOA	
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**
Post-listing	Upper Willamette River Chinook	1998	2	2.8
		1999	0	0.0
		2000	0	0.0
		2001	5	41.0
		2002	3	32.5
		2003	1	11.6
		2004	0	0.0
		2005	0	0.0
		2006	0	0.0
		2007	0	0.0
		2008	0	0.0
		2009	0	0.0
		2010	0	0.0
		2011	1	1.2
		2012	0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 5, Table 4 continued

Table 4. Number and mark expansion of ESA-listed CWT salmon captured in GOA research surveys by ESU, by run year, post-listing, 1991–2012. No ESUs were captured in GOA research surveys pre-listing, and no ESA-listed CWT salmon have ever been recovered in BSAI research surveys. Observed numbers include CWTs that are collected and verified.

F. Snake River Basin steelhead ESU			GOA	
Listing Status	**ESU Name**	**Run Year**	**Number Recovered**	**Mark expansion**
Post-listing	Snake River Basin Steelhead	1991	0	0.0
		1992	0	0.0
		1993	0	0.0
		1994	0	0.0
		1995	0	0.0
		1996	0	0.0
		1997	0	0.0
		1998	1	unknown
		1999	0	0.0
		2000	0	0.0
		2001	0	0.0
		2002	0	0.0
		2003	0	0.0
		2004	0	0.0
		2005	0	0.0
		2006	0	0.0
		2007	0	0.0
		2008	0	0.0
		2009	0	0.0
		2010	0	0.0
		2011	0	0.0
		2012	0	0.0

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 6

Table 1. Number and mark expansion of CWT Chinook salmon recovered in the bycatch of the BSAI groundfish fisheries run year and state or province of origin, 1995 through 2012.

	Alaska		British Columbia		California		Oregon		Washington		Yukon Territory		TOTAL	
run_ year	**Number Recovered**	**CWT Mark Expansion**	**Number Recovered**	**CWT Mark Expansion**	**Number Recovered**	**CWT ark Expansion**	**Number Recovered**	**CWT Mark Expansion**	**Number Recovered**	**CWT Mark Expansion**	**Number Recovered**	**CWT Mark Expansion**	**Number Recovered**	**CWT Mark Expansion**
1995	0	0.0	1	2.3	0	0.0	0	0.0	0	0.0	1	5.7	**2**	**8.0**
1996	2	5.7	20	261.8	0	0.0	5	6.7	0	0.0	0	0.0	**27**	**274.2**
1997	39	150.5	27	349.0	0	0.0	8	14.7	3	23.0	1	1.0	**78**	**538.3**
1998	26	82.0	28	220.3	2	16.4	1	1.0	2	11.1	2	5.2	**61**	**335.9**
1999	2	2.9	5	81.4	0	0.0	1	1.0	0	0.0	1	1.0	**9**	**86.4**
2000	2	190.3	1	1.7	0	0.0	1	1.0	0	0.0	1	1.0	**5**	**194.1**
2001	14	16.9	6	31.0	0	0.0	2	2.0	1	1.7	1	1.0	**24**	**52.6**
2002	27	32.7	18	284.8	0	0.0	21	42.8	12	31.2	1	1.0	**79**	**392.5**
2003	6	24.6	13	82.3	0	0.0	4	4.1	3	18.3	2	2.0	**28**	**131.3**
2004	16	37.2	21	122.3	0	0.0	11	115.8	6	7.7	2	2.0	**56**	**285.1**
2005	12	15.9	17	114.6	0	0.0	8	22.8	7	7.9	1	1.0	**45**	**162.2**
2006	16	38.8	8	93.7	0	0.0	6	12.9	5	5.2	1	1.0	**36**	**151.5**
2007	5	19.4	1	12.2	0	0.0	2	2.0	1	1.5	0	0.0	**9**	**35.2**
2008	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**0**	**0.0**
2009	0	0.0	3	4.8	0	0.0	1	10.2	0	0.0	0	0.0	**4**	**15.0**
2010	0	0.0	2	2.9	0	0.0	4	37.9	7	9.8	0	0.0	**13**	**50.6**
2011	0	0.0	0	0.0	0	0.0	0	0.0	2	2.0	0	0.0	**2**	**2.0**
2012	1	1.7	1	9.4	0	0.0	0	0.0	0	0.0	0	0.0	**2**	**11.1**
TOTAL	**168**	**618.7**	**172**	**1674.7**	**2**	**16.4**	**75**	**274.8**	**49**	**123.5**	**14**	**21.9**	**480**	**2730.0**
mean	**9.3**	**34.4**	**9.6**	**93.0**	**0.1**	**0.9**	**4.4**	**15.3**	**2.7**	**6.9**	**0.8**	**1.2**	**26.7**	**151.7**
average % of total	**35%**	**23%**	**36%**	**61%**	**0%**	**1%**	**17%**	**10%**	**10%**	**4%**	**3%**	**1%**	**100%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/13

Attachment 6, continued

Table 2. Number of CWT Chinook salmon recovered in the prohibited species catch of the BSAI groundfish fisheries by state or province of origin and rearing type, 1995 through 2012.

	Rearing Type			
Origin	**Hatchery**	**Mixed**	**Wild**	**TOTAL**
Alaska	158	0	10	**168**
British Columbia	172	0	0	**172**
California	2	0	0	**2**
Oregon	75	0	0	**75**
Washington	47	1	1	**49**
Yukon Territory	14	0	0	**14**
TOTAL	**468**	**1**	**11**	**480**
average % of total	**98%**	**0%**	**2%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Table 3. Percent run-type of CWT Chinook salmon recovered in the prohibited species catch of the BSAI groundfish fisheries by state or province of origin by run type, 1995 through 2012

	Run-type						
Origin	**Spring**	**Summer**	**Fall**	**Winter**	**Late Fall**	**Late Fall Upriver Bright**	**TOTAL**
Alaska	100%	0%	0%	0%	0%	0%	**100%**
British Columbia	20%	37%	43%	0%	0%	0%	**100%**
California	0%	0%	100%	0%	0%	0%	**100%**
Oregon	27%	0%	69%	3%	0%	1%	**100%**
Washington	16%	4%	76%	0%	0%	4%	**100%**
Yukon Territory	50%	29%	14%	0%	7%	0%	**100%**
Mean	**40%**	**18%**	**41%**	**0%**	**0%**	**1%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 7

Table 1. Age structure of CWT Chinook salmon captured in the bycatch of the GOA and BSAI groundfish fisheries, 1995–2012

Fishery*	Age-2	Age-3	Age-4	Age-5	Age-6	TOTAL
GOA	15%	45%	33%	6%	1%	**100%**
BSAI	17%	48%	28%	6%	1%	**100%**

* Excludes Alaska stocks

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Table 2. Age structure of CWT Chinook salmon recovered in the bycatch of the GOA pollock fishery as sampled in the Tunnel Detector Test, 2012.

Fishery	Age-2	Age-3	Age-4	Age-5	Age-6	TOTAL
GOA	52%	44%	3%	1%	0%	**100%**

* Excludes Alaska stocks

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 8

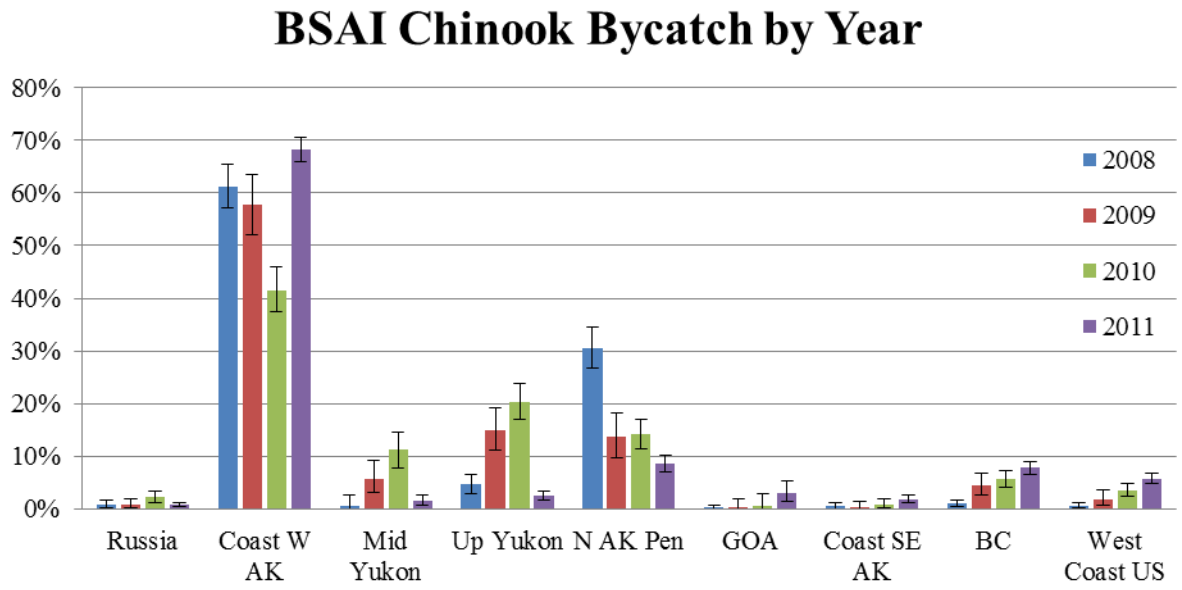

Figure 1. Comparison of yearly stock composition estimates (2008–2011) based on available genetic samples from the Bering Sea Chinook salmon bycatch. The same genetic baseline and general regional groupings were used in all analyses. GOA group consists of combined values for NW GOA, Copper, and NE GOA. BAYES 95% credible intervals are plotted for yearly estimates.
Source: Guthrie et al. 2013

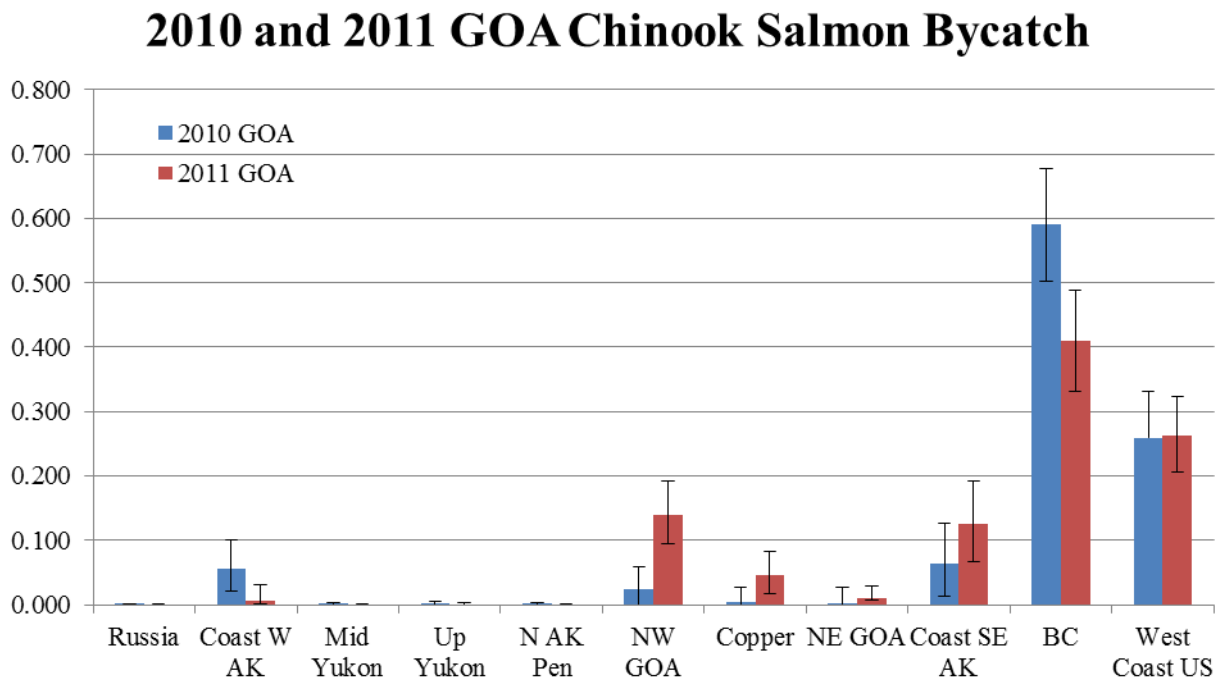

Figure 2. Comparison of yearly stock composition estimates (2010–2011) based on available genetic samples from the GOA salmon bycatch. The same genetic baseline and general regional groupings were used in all analyses. BAYES 95% credible intervals are plotted for yearly estimates.
Source: Guthrie et al. 2013

Attachment 9

Table 1. Observed number and mark expansion of CWT Chinook salmon recovered in the bycatch of the GOA groundfish fisheries by run year and state or province of origin, 1995 through 2012.

	Alaska		British Columbia		Idaho		Oregon		Washington		TOTAL	
run_year	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion
1995	4	11.9	17	177.3	0	0.0	4	7.0	2	2.0	**27**	**198.2**
1996	14	92.4	10	152.9	0	0.0	3	3.5	2	2.0	**29**	**250.7**
1997	2	17.4	12	82.9	0	0.0	4	10.6	1	3.7	**19**	**114.6**
1998	30	157.8	50	585.3	1	1.0	10	55.2	9	19.0	**100**	**818.3**
1999	45	244.3	51	295.9	0	0.0	32	76.7	17	127.9	**145**	**744.7**
2000	24	224.9	18	38.1	0	0.0	32	50.0	10	16.2	**84**	**329.1**
2001	10	100.2	6	74.8	0	0.0	12	16.5	4	4.0	**32**	**195.6**
2002	10	47.2	5	113.0	0	0.0	4	4.3	3	3.7	**22**	**168.2**
2003	2	22.4	2	28.6	0	0.0	4	8.3	1	1.0	**9**	**60.3**
2004	3	30.5	4	22.0	0	0.0	5	16.9	1	1.1	**13**	**70.6**
2005	3	33.6	4	86.5	0	0.0	2	3.1	2	2.2	**11**	**125.4**
2006	10	58.3	7	158.3	0	0.0	2	2.1	5	14.5	**24**	**233.1**
2007	13	99.1	3	50.9	0	0.0	2	2.1	5	21.3	**23**	**173.3**
2008	6	52.3	1	1.0	0	0.0	3	9.3	12	12.9	**22**	**75.5**
2009	5	41.4	2	5.2	0	0.0	2	2.8	4	4.5	**13**	**53.9**
2010	10	81.3	4	4.0	0	0.0	10	25.9	12	23.7	**36**	**135.0**
2011	3	32.3	1	51.4	0	0.0	2	13.4	2	2.0	**8**	**99.2**
2012	8	56.5	13	34.7	1	2.0	24	134.1	30	59.2	**76**	**286.5**
TOTAL	**202**	**1403.7**	**210**	**1962.9**	**2**	**3.0**	**157**	**441.8**	**122**	**320.9**	**693**	**4132.3**
mean	**11.2**	**78.0**	**11.7**	**109.0**	**0.1**	**0.2**	**8.7**	**24.5**	**6.8**	**17.8**	**38.5**	**229.6**
average % of total	**29%**	**34%**	**30%**	**48%**	**0%**	**0%**	**23%**	**11%**	**18%**	**8%**	**100%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 9, continued

Table 2. Number of Chinook salmon CWTs recovered and CWT Mark Expansion of CWT Chinook salmon captured in the bycatch of the GOA groundfish fishery as sampled in the Tunnel Detector Test, 2012.

	Alaska		British Columbia		Idaho		Oregon		Washington		TOTAL	
run_year	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion	Number Recovered	CWT Mark Expansion
2012	5	56.5	13	34.7	1	2.0	24	134.1	30	59.2	**71**	**286.5**
average % of total	**7%**	**14%**	**18%**	**14%**	**1%**	**1%**	**34%**	**53%**	**39%**	**19%**	**100%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 9, continued

Table 3. Number of CWT Chinook salmon captured in the bycatch of the GOA groundfish fishery by state or province of origin and by rearing Type, 1995–2012 Observed numbers include CWTs that are collected and verified.

	Rearing Type				
Origin	**Unknown**	**Hatchery**	**Mixed**	**Wild**	**TOTAL**
Alaska	0	183	0	19	**202**
British Columbia	0	210	0	0	**210**
Idaho	1	1	0	0	**2**
Oregon	0	157	0	0	**157**
Washington	0	108	11	3	**122**
TOTAL	**1**	**659**	**11**	**22**	**693**
average % of total	**0%**	**95%**	**2%**	**3%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Table 4. Number of CWT Chinook salmon captured in the bycatch of the GOA groundfish fishery by state or province of origin and by rearing type, as sampled in the Tunnel Detector Test, 2012. Observed=collected/verified

	Rearing Type				
Origin	**Unknown**	**Hatchery**	**Mixed**	**Wild**	**TOTAL**
Alaska	0	5	0	0	**5**
British Columbia	0	13	0	0	**13**
Idaho	0	1	0	0	**1**
Oregon	0	24	0	0	**24**
Washington	0	28	0	0	**28**
TOTAL	**0**	**71**	**0**	**0**	**71**
average % of total	**0%**	**100%**	**0%**	**0%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Attachment 9, continued

Table 5. Percent run-type of CWT Chinook salmon captured in the bycatch of the GOA groundfish fishery by state or province of origin, 1995–2012

	Run-type						
Origin	**Spring**	**Summer**	**Fall**	**Winter**	**Late Fall**	**Late Fall Upriver Bright**	**TOTAL**
Alaska	100%	0%	0%	0%	0%	0%	**100%**
British Columbia	26%	43%	31%	0%	0%	0%	**100%**
Idaho	0%	0%	0%	0%	0%	100%	**100%**
Oregon	54%	0%	41%	1%	0%	3%	**100%**
Washington	6%	25%	57%	0%	3%	8%	**100%**
MEAN	**45%**	**20%**	**31%**	**0%**	**1%**	**3%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

Table 6. Percent run-type of CWT Chinook salmon captured in the bycatch of the GOA groundfish fishery by state or province of origin, as sampled in the Tunnel Detector Test, 2012

	Run-type						
Origin	**Spring**	**Summer**	**Fall**	**Winter**	**Late Fall**	**Late Fall Upriver Bright**	**TOTAL**
Alaska	0%	100%	0%	0%	0%	0%	**100%**
British Columbia	15%	77%	8%	0%	0%	0%	**100%**
Idaho	0%	0%	0%	0%	0%	100%	**100%**
Oregon	63%	0%	29%	1%	0%	8%	**100%**
Washington	22%	11%	50%	0%	0%	17%	**100%**
MEAN	**32%**	**23%**	**33%**	**0%**	**0%**	**12%**	**100%**

Source: NMFS Alaska Fisheries Science Center Auke Bay Laboratories, Adrian Celewycz, 3/31/2013

G:\FMGROUP\ESA\2013 ESA salmon\Report EOY 12 salmon report to NWR.mmo.docx

R:\region\archives\2013\jun\Report EOY 12 salmon report to NWR.mmo.docx

Jhartman: 4/5/13, 4/11/13, 05/31/13, 6/10/13, 6/14/13
Gaberle: 04/09/13, 05/30/13
Mgrady: 4/8/13
Mloefflad: 4/30/13
Pnelson; 4/30/13
Acelewycz, 5/13/13
Jguyon: 4/22/13
Dschane: 6/21/13
Mbrown: 5/21/13, 6/8/13
GMerrill: 6/14/13